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JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

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THE SEVENTY-FIRST ANNUAL CONVENTION OF THE AMERICAN PHARMACEUTICAL ASSOCIATION WILL BE HELD IN ASHEVILLE, N. C., DURING THE WEEK OF SEPTEMBER 3, 1923.

The 1923 meetings of the American Conference of Pharmaceutical Faculties and the National Association of Boards of Pharmacy will also be held in Asheville during the week of September 3.

For Association Roster see pages x, xii, xiv, and xv.

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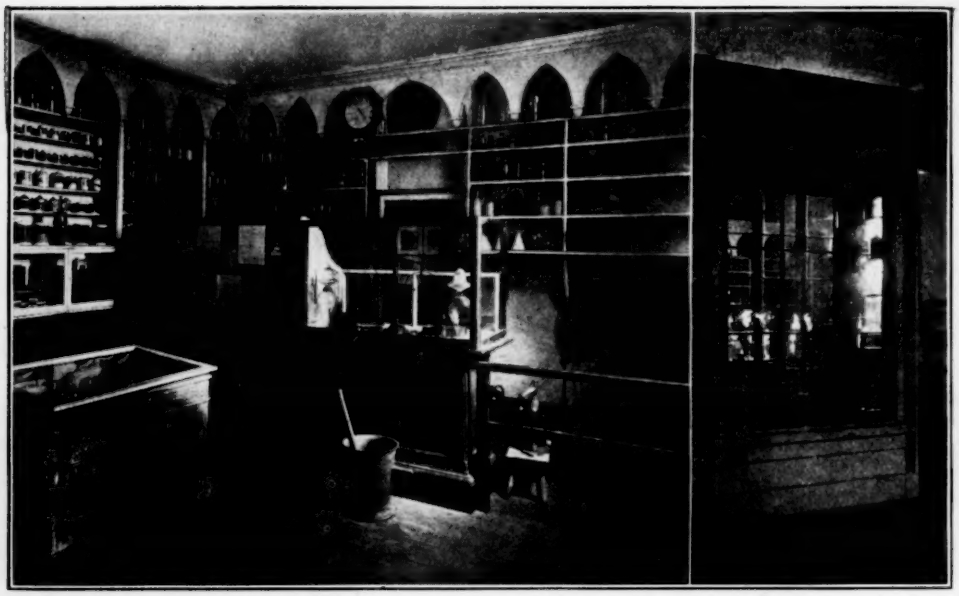

APOTHECARIES' HALL.

The interior fittings of Apothecaries' Hall in Charleston Museum. Originally the shop was a square front room, 17 × 17 feet, the corner room of a private house, without shop-door; its entry was through the house-hall. The interior of the shop is shown in the reproduction, also the show window and a small part of the house-hall.

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APOTHECARIES' HALL.

The paper from which this article is abstracted was prepared by Honorary Curator John Bennett of the South Carolina Culture Collections, Charleston Museum, and presented by Prof. W. H. Zeigler to the Section on Historical Pharmacy at the Cleveland Meeting, A. Ph. A. A general description of Apothecaries' Hall is given on the back of the frontispiece; reference is made to the old drug store described under the illustration re-produced from a photograph by Charles Jacobs and presented by the author.

The name of the founder of Apothecaries' Hall is not known, but during the British occupation, in 1781, he was succeeded by Dr. Andrew Turnbull, a dispensing physician. Most of the valued possessions—interior fittings, shelf-ware and equipment, and a portion of the exterior trim—are owned by and exhibited in the Charleston Museum. Three generations have known the shop as "Schwettmann's Drug Store," prior to that period as Dr. Trott's "Deutsche Apotheke," De la Motta's drug store and, throughout this time, as "Apothecaries' Hall—at the sign of the "Big Gilt Mortar"—and to the sable island contingent as "de big yalluh bucket."

The author refers to the interior fittings of an old apothecary shop, aged ninety years, in the Museum of Essex Institute at Salem, Mass., and the famous old drug store (Bond's) at Fredericksburg, Va., established by Elisha Hall in 1791. Very interesting local, state and national historical data are given of the period during which this old apothecary shop served the public. The author is quoted in the following remarks relating to the time when Apothecaries' Hall was founded:

"The grocers imported drugs at wholesale, vended at retail, often prescribed; they imported tea, coffee, spices, sugar, cocoa, wine, rum, brandy, dried fruits, compounded medicines and drugs of every sort, and were wont to dispense them by the dose, until it was enacted by law that no grocer should run an apothecary shop and that a surgeon should not sell medicines, but must confine himself strictly to lancet and cup."

"In Charleston, Basil Pourrie handled dry goods, cake, blacking, saddles, paint, glue, ironmongery, glassware and medicine. Samuel Carnes sold spices, articles of grocery, and most kinds of drugs and medicines. McKenzie & Watson sold violins, flutes, china, glassware, haberdashery, stationery, cutlery, silverware, books, prints, tea, coffee, ... , and standard drugs. McMurray sold liquors, soaps, candles, and medicines. Even the printer took a shy at the drug business, and disposed of several thousand pounds of sassafras, 'reasonable for cash.' "

Reference is made to Dr. John Morgan* and the author cites that Dr. Abraham Chouvert, of Philadelphia, wrote the first American prescription for an apothecary to compound; "there

* See THIS JOURNAL for June, p. 477.

[EDITOR'S NOTE.—The drug store opened by George Glenworth in 1812, and for ninety-two years conducted by his descendants, without making any material alterations, is on exhibition in the Museum of Philadelphia College of Pharmacy and Science.]

was no American pharmacopœia[1] nor dispensatory." The Edinburgh Dispensatory was in greatest demand for its progressiveness, and was included, under the heading of Pharmacy, in the first American edition of the Encyclopaedia Brittanica, in 1798.

THE OWNERS OF THE APOTHECARY SHOP.

In preparing these brief sketches the article presented by Mr. Bennett is drawn upon.

"At the old shop on the corner of King and Broad Streets, now so fortunately reconstructed in the Charleston Museum, Dr. Andrew Turnbull—in accord with the practice of his time—imported, prescribed and dispensed his own remedies as pharmacist and physician. He was born and educated in Scotland, as a young man he settled in Asia Minor and established a successful medical practice. He married a Greek merchant's daughter and, with others, undertook to colonize Greeks and Minorcans on the eastern coast of Florida, to cultivate fruits on a grant of 20,000 acres from the British Crown." At the outbreak of the American Revolution an insurrection caused complete financial loss for Dr. Turnbull, who came from St. Augustine to Charleston in 1781, where he successfully practiced his profession until his demise in 1792. He was one of the charter members of the Medical Society of South Carolina and took part in its first proposal to reform the apothecary business in Charleston. He is buried in St. Philips graveyard of the latter city.

Dr. Joseph Choulder succeeded Dr. Turnbull as "Physician and Apothecary." He advertised his wares and "that orders would be attended with utmost dispatch." William Burgoyne was successor to Dr. Choulder, as Apothecary, until 1816, when the business was acquired by Dr. Jacob De la Motta, a medical practitioner and scientist. He was active in medical, state and municipal affairs and held in high esteem. With him was associated, as chemist, Felix Louis L'Herminier, M.D., a brilliant but unfortunate Frenchman, a scientist, chemist and physician. He had spent twenty years in scientific research in Guadaloupe and was compelled to leave there owing to political disturbances. He brought with him to Carolina a valuable and extensive collection; among the specimens, that of the "Fossil Man of Guadaloupe." His collection was purchased by coöperation of various interests and placed in the Museum of which he became superintendent. Here he did excellent work and created a great interest in natural sciences. An unsuccessful venture to establish an extensive chemical and pharmaceutical laboratory brought him into business association with Dr. De la Motta. Some years afterward he accepted an invitation to return to France where he resided during the remaining years of his eventful life. John H. Niebuhr was the next pharmacist in the establishment until early in the 40's when Dr. William H. Trott was engaged as pharmacist and apothecary.

The latter, after the death of Dr. De la Motta, in 1845, took over the business and enlarged and improved the drug store and installed fixtures for gas. During the war between the States the store was moved to a point up town beyond the reach of Gilmore's batteries at the south-east corner of King and John Streets. In 1865 the old building was repaired—the fallen door bell was re-hung, the front doors remounted, the great brazen counter-scale was mended and a new lot of labels printed. An incident in the latter connection is of interest. The "Hippo" label was replaced by a Syrup of Ipecac label, but it was soon found that the label was not understood by the old patronage. A colored boy came back with a bottle of the Syrup and said "Dat ain't wut Misses want," and "what does she want" asked Dr. Trott? "She says she want 'Hippo' suh, and she say dat ain't it." A new supply of labels was printed.

Another incident about this period (1867), during a year when there were long continued rains, a rumor gained ground among the negroes that Dr. Trott had a mermaid in captivity which caused the downpour, but as no mermaid was found when search was made in the store the rioters dispersed.

In 1870 Dr. Trott sold out the business to his former associate Dr. Christian Frederick Schwettmann who had entered the business with his predecessor, served as apothecary in the Confederate Army, and engaged in business in various localities until he returned to the store of his apprenticeship. He was one of the organizers and a life long member of the South Carolina Pharmaceutical Association, its treasurer in 1877, a vice-president in 1886 and President from 1888 to 1890. During his ownership the store was enlarged and improvements made. His son,

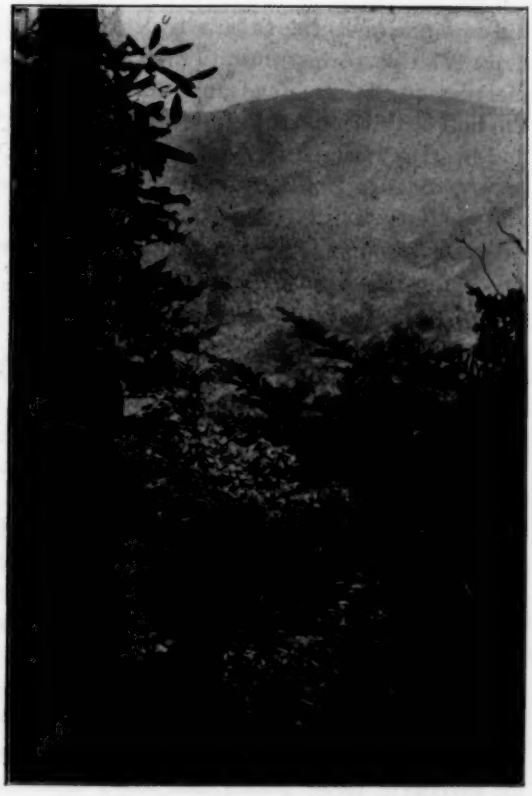
[1] A Pharmacopœia "for the use of the Hospital belonging to the Army of the United States," was published in 1778.

Dr. F. W. Schwettmann, was taken into partnership and, later, succeeded to the business. During a period of nearly three generations the members of the firm served the public faithfully and with credit and honor to themselves. It was through the latter that Mr. Bennett became interested in the history of the store.

After the death of Dr. F. W. Schwettmann (1915) the business was taken over by Dr. John F. Huchting. He removed the old business to 125 King Street where "the big yalluh bucket," Jacob De la Motta's famous sign of the "Golden Mortar," was hung above the door. The old shop was completely remodeled in 1921 by the Poulnot Drug Company under the management of Dr. Frederick S. Poulnot, grandson of Dr. C. F. Schwettmann. In refitting the new shop the old appurtenances now attaining unique historical value, Dr. Huchting proposed to the Charleston Museum to present all such material as remained for preservation as a perpetual memorial of honor and affectionate regard for his former employer and friend Dr. F. W. Schwettmann. The Museum accepted the offer of this memorial which includes many other items besides those mentioned in the forepart of this abstract, and has made possible the interesting contribution by Curator John Bennett, to whom credit is due for the data here presented. E. G. E.

MT. MITCHELL.

On Saturday, September 8th, the delegates attending the Asheville meeting of the American Pharmaceutical Association will travel by automobile over a 35-mile scenic highway to the top of Mt. Mitchell, where they will spend the day. This peak is 6,711 feet in altitude, and is the highest point east of the Rocky Mountains. It is surrounded by hundreds of peaks more than 5,000 feet high and by twenty-two that reach to greater heights than Mt. Washington. The road to Mitchell is pavement for the first sixteen miles; then the ascent begins. The trail up the mountain winds tortuously between chasm and cliff, but the going is safe because all travel is in the same direction. The views are constantly changing their nature and the panorama offers surprises even to those who have often traveled the trail before. Delegates will be given appetising box lunches as they leave the hotel and will be served coffee, tea, etc. on the summit. They will be urged to abandon dignity, enter into the picnic spirit of the trip, play games, sing songs, hunt wild flowers and medicinal herbs, and forget the world 'way off below.



Mt. Mitchell, the Roof of Eastern America.

EDITORIAL

E. G. EBERLE, Editor 253 Bourse Bldg., PHILADELPHIA

THE REWARD OF SCIENTIFIC RESEARCH.

THE late Emilé Duclaux said: "The free disinterested search for truth is useful, in and of itself, from the delight it brings to the one who follows it, from the independence of spirit it begets, from the deep sentiment it develops of liberty and responsibility."

The reward of Dr. F. G. Banting and C. H. Best, discoverers of insulin, is in the joy and satisfaction of relieving thousands from the discomforts of disease and bringing back to health many whose lives were ebbing under its toxic influence. Traits of Dr. Banting's character are evidenced in the lines of news items.—Tendered opportunities for bettering his financial status, even though accompanied by offers in which the professional viewpoint was given consideration, did not persuade the savant to leave Toronto. Evidently he did not seek publicity relative to his invitation to address the recent British Medical Association meeting, for he remained unnoticed for a time, as a listener to the proceedings in the hall of this convention; but when discovered, the members forgot their dignity and heartily cheered the young Canadian. Conclusions may be drawn from these press notices of Dr. Banting's professional character, loyalty to his native country, and modesty.

It is a source of great satisfaction to note that Canada has not been unmindful of the important discovery for mankind, and has provided an unconditional annuity of $7,500 for Dr. Banting. A provision was also made at the recent session of the Ontario Legislature whereby a department of research is created in the Provincial University of Toronto—the chair is to be known permanently as the Banting—Best Chair of Research—and by understanding with the Government the University of Toronto has appointed Dr. Banting as its first incumbent with a salary of $6,000 a year. A proposal to further honor the latter is through an insurance policy on his life for $1,000,000; the proceeds, after a minor contingent provision for the insured, is to be paid as an endowment for research; of interest is the fact that the insurance companies are already benefiting by the discovery, and will bear the greater part of the expense of the policy.

In connection with the foregoing reference may be made to the interesting work carried on in the Department of Biochemistry, University of Alberta, Edmonton, Canada. Dr. J. B. Collip, formerly one of the Toronto University group who first made insulin and now at the University of Alberta, conceived the idea that, since injection of "insulin" enables the animal to burn sugar and store up glycogen, those plants and lower animals which contain glycogen might also contain this active principle. A preliminary paper on the subject "A New Hormone Present in Plant Tissue," by Dr. J. B. Collip, has been printed in the *Journal of Biological Chemistry*, and liberty is taken in reprinting two paragraphs from "General Conclusion" and those of "the Summary" in the article referred to:

"There is a decided difference between the general type of effect produced on both normal rabbits and depancreatized dogs by insulin and by glucokinin. The fall in the concentration of blood sugar in both normal and diabetic animals begins shortly after the administration of insulin. A low point is reached in from 2 to 6 hours and then the return to the original and higher level begins. To obtain the best results in the treatment of diabetic patients with insulin it is therefore necessary for the hormone to be administered frequently (two to three times daily). The effect of glucokinin, on the other hand, develops slowly and is long maintained. If it should develop, therefore, that this latter substance is serviceable in the clinic it will have a great advantage over insulin in this one respect at least. Its source would also be a point of great importance because it would be available the world over."

"The fact that certain extracts made from variety of plant tissues so divergent in character as the unicellular yeast organism, green leaves, and roots of higher plants appear to be, are capable of producing a profound disturbance in the sugar metabolism of normal rabbits and, in the few cases tested out, of depancreatized dogs, points to the existence in the plant kingdom of a hormone somewhat analogous to that produced in the higher animals by the islet of the pancreas. Such a hormone in all probability plays a similar rôle in the metabolism of sugar in the plant to that played by insulin in the animal. As glycogen formation is possible in the animal as a result of the activity of the pancreatic hormone it is possible that starch formation in the plant is, to a certain extent at least, dependent on the activity of glucokinin. A new field of investigation of great scope in plant physiology is hereby opened up. A few of the new problems presenting themselves are about to be studied by the author in collaboration with Dr. F. J. Lewis."

"1. Extracts have been prepared from the vegetative tissues of several angiospermous plants as well as yeast, subcutaneous administration of which produces marked hypoglycemia in normal rabbits.

"2. Certain of these extracts have been administered to depancreatized dogs. A fall in the level of blood sugar and a decrease in the hourly excretion of sugar results.

"3. The primary effect was an increase in the rate of sugar elimination.

"4. The name glucokinin has been suggested for the new hormone derived from plant sources.

"5. The physiological effect of glucokinin develops slowly and is long maintained."

Paraphrasing statements, in closing this comment, by Emilé Duclaux—"You will not always find glory in the laboratories, but you will experience there the delight of every day being something more than the day before, and of having brought into the world your share of the truth. There is no end to science. So long as there shall be men, there will be savants, and so long as there shall be savants there will be discoveries." E. G. E.

"TRADE ASSOCIATION ACTIVITIES."

DECLARING that the trade association as a facility for the promotion and self-regulation of industry and commerce has become, by reason of its scope and activity, an important American business institution, with which the public, generally speaking, is little acquainted, the Secretary of Commerce, in the introduction to that Department's new book entitled "Trade Association Activities" expressed the opinion that the constructive purposes of these organizations have unfortunately been confused with the minority of activities which have been used as a cloak for action against public interest. "Just as a business house or an individual meets its obligations and carries on its daily relations within the community, so the trade association has a real individuality in the business fabric," according to Secretary Hoover. It can safely be stated that Government officials

as well as the public now have a very different concept of the values of association, organization and even combination in trade, than a decade ago. There are still greater opportunities and obligations for both government and associations in coördinated coöperative service. There is no question but that the group idea is misleading many and persuading them to work for themselves, their interest alone—business groups, social groups, labor groups, etc.—thus enlisted they add to the problems of government and, hence, to those of the individuals in the groups.

Secretary Hoover states that "the interest of any one industry or trade, to be sound in the ultimate analysis, must be the public interest, and in their legislative activities many trade associations have borne this axiom foremost. The demand of legislatures for the views of the different trades upon all sorts of questions of public interest is incessant, and the open preparation and presentation of such matters is far more consonant with proper development of public life than the private lobbying of the few or powerful.

"Waste elimination in a vast area of problems can only be accomplished by collective action in a trade. Hundreds of millions of dollars have been saved through the adoption of principles laid down in each program, not alone to the business groups concerned, but to the ultimate consumer. They have brought about lower prices, through attacking directly the costs of raw material, inefficient plant operation and unnecessary stock maintenance."

Secretary Hoover points to the truly remarkable findings of government agencies in the war years regarding the knowledge and understanding of costs in production and distribution, and says the trade association is proving itself the most potent organized influence in the study of costs in industry and trade.

In commenting on the service of trade associations in the preparation of statistical data which will serve as guides, Secretary Hoover says in part: "There is no question but that the curves in the business cycle from activity to depression have been less disastrous in those industries or trades where accurate, lawful statistical data have been available to all. Fundamentally it is impossible for business men to form those vital judgments as to their future course of action in the wise and safe direction of their activities unless they are informed as to the changing currents of production and consumption, not only in their own lines but also in other lines of business, which indicate broader currents of economic life. The only criteria are statistics and if industry is to march with reasonable profits instead of undergoing fits of famine and feast, if employment is to be held constant and not subjected to vast waves of hardship, there must be adequate statistical service. Whether these services are to be maintained by the Government or by trade associations, they must be maintained if we are to have an orderly economic life."

There is strength in a foundation of confidence, respect and trust, and wisdom in bringing the Government into closer relation with the activities that are essential for the prosperity of the country.—E. G. E.

DEATH OF THE PRESIDENT.

The Nation has bowed its head as one in sorrow because of the death of its Chief Magistrate, and evidenced its tender sympathy for Mrs. Harding. The country has expressed its confidence in President Coolidge as a wise and constructive leader and is hopeful that its affairs will go steadily forward.

SOME CONSTITUENTS OF RAGWEED POLLEN.

BY FREDERICK W. HEYL.

With this report, the chemical investigation of ragweed pollen is completed.[1] The work described below was carried out upon the ether and alcohol extracts, which had been removed before making the protein extracts that were first studied.

The fatty acids in the ether extract include formic, acetic, valeric, lauric, an unsaturated acid, $C_{10}H_{18}O_2$, oleic, linoleic, palmitic and myristic acids.

The alcoholic extract contained a mixture of phosphatides; repeated purification indicating the presence of an acetone-insoluble lipin fraction. The resin precipitated by pouring the alcoholic extract into water amounted to about 6.2% (exclusive of fat). Nothing crystalline could be derived from it.

The water-soluble part of the alcohol extract, from which the yellow coloring matters had been precipitated with basic lead acetate solution, yielded the following substances: a trace of guanosin, adenine, betaine (1.0%) sucrose, and levulose. Glucosides are absent.

The application of a systematic scheme of plant analysis to ragweed pollen has therefore yielded about 27 well defined substances, but with the exception of the coloring substances and possibly the proteose obtained from the water soluble fraction, none of these substances appear to represent any chemical specialization in this cell.

EXPERIMENTAL PART.

A. Ether Extract of Pollen was prepared by macerating 800 Gm. (moisture = 5.2%) which had been thoroughly desiccated over sulphuric acid with four portions of anhydrous ether, each extract amounting to about three liters. The ether was removed and the residue was found to be completely soluble in low boiling petroleum ether. This extract weighed 89 Gm.[2] and is equivalent to 11.1% of the pollen.

This extract is free from phosphorus.

The ligroin was removed, the material dissolved in ether and extracted with dilute hydrochloric acid, and with solutions of ammonium carbonate, potassium carbonate, and potassium hydroxide, but nothing of interest was found in the slight quantities thus obtained by means of the first two solvents.

The extraction with potassium carbonate was small but it was subjected to a steam distillation after acidification and the potassium hydroxide solution which contained about 7.8 Gm. was treated similarly.

These steam distillates were joined. Titration of a small aliquot showed that they required 13.0 cc $N/2$ alkali for neutralization. The acid distillate was shaken with ether. The aqueous layer was almost neutralized by the addition of 8 cc $N/2$ alkali and concentrated to a small volume. The repeated additions of small portions of silver nitrate solution to the hot solution showed the presence of considerable formic acid because of the formation of blackened reduced precipitates. When at length the formic acid had been removed by heating with silver nitrate a crop of crystals of a white silver salt was obtained.

0.0473 Gm. gave 0.0293 Gm. Ag. Calc. for $C_2H_3O_2Ag$: Ag, 64.6. Found: Ag, 61.9%

[1] *J. A. C. S.*, 39, 1470 (1917); 41, 670 (1919); 41, 1285 (1919); 42, 1738 (1920); 44, 2283 (1922).

[2] A few small samples were added to this material before proceeding.

This material is essentially silver acetate, but small quantities of a higher acid are present.

The ether extract of the acid steam distillate was dried over anhydrous sodium sulphate and the solvent was removed. The residue required 3.2 cc $N/2$ alkali for neutralization. The addition of silver nitrate solution precipitated about 0.3 Gm. of a heavy silver salt.

0.1177 Gm. gave 0.0391 Gm. Ag. Calc. for $C_{12}H_{23}O_2Ag$: Ag, 35.1. Found: Ag, 33.2.

This appears to be a small quantity of lauric acid.

The residues in the distilling flask after steam distillation were shaken out with ether and esterified by the process of I. K. Phelps and M. A. Phelps.[1] The solution of the esters in ether was extracted with solutions of potassium carbonate, and of potassium hydroxide but these extracts yielded nothing of interest. The esters were distilled at 15 mm. into three fractions (1)[2] 130–166° (2) 166–200°, (3)[2] 200–250°. These were joined and saponified. The acids, amounting to 4.0 Gm. were added to the non-volatile acids used in making lead salts as described below.

The ethereal extract of the pollen which had been shaken with solutions of hydrochloric acid, ammonium carbonate, potassium carbonate and potassium hydroxide was evaporated to dryness, and the residue dissolved in 200 cc alcoholic potassium hydroxide and saponified by boiling for five hours on a reflux.

The alcohol was removed, and the residue diluted with 500 cc water. The unsaponifiable matter was extracted with ether. The ether solution was dried over anhydrous sodium sulphate and upon removing the solvent 51 Gm. of an orange colored oil was isolated. The examination of this fraction has been previously reported.[3]

Examination of the Volatile Fatty Acids.—The alkaline solution from which the unsaponifiable material had been extracted with ether was acidified with dilute sulphuric acid and subjected to a vigorous steam distillation. The distillate was neutralized with a solution of barium hydroxide (equivalent to 11.7 cc N alkali) and concentrated to a volume of about 100 cc when a barium salt separated out. This was filtered off, returned to a small distilling flask, decomposed with sulphuric acid, and recovered by steam distillation. This steam distillate amounting to 100 cc was shaken with ether, and all the acid was thus extracted. The ether was removed and the residue almost exactly neutralized with 2.3 cc $N/2$ alkali and the silver salt prepared in the usual manner. It separated as a cheesy precipitate.

I, 0.2823 Gm. gave 0.1229 Gm. Ag. Calc. for $C_{10}H_{17}O_2Ag$: Ag; 39.0. Found. Ag, 40.0.

The neutral solution of the barium salts from which this had separated, contained considerable quantities of formic acid which was removed by boiling with silver nitrate solution. After filtering off the blackened precipitate there was obtained a series of silver salts amounting in all to about 0.6 Gm. The fourth was the heaviest fraction.

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[1] *Amer. J. Sci.*, (IV) **24**, 194–196 (1907).

[2] Iodine No. (1), 29.7; (3), 121.3.

[3] *J. A. C. S.*, **44**, 2283 (1922).

II 0.1398 Gm. gave 0.0586 Gm. Ag. Found 41.9% Ag
III 0.1986 Gm. gave 0.0918 Gm. Ag. Found 46.2% Ag
IV 0.0958 Gm. gave 0.0472 Gm. Ag. Found 49.3% Ag
V 0.0592 Gm. gave 0.0299 Gm. Ag. Found 50.5% Ag

Calc. for $C_{12}H_{23}O_2Ag$: Ag, 35.1; $C_6H_{11}O_2Ag$: Ag, 48.4.
Calc. for $C_{10}H_{17}O_2Ag$: Ag, 39.0; $C_5H_9O_2Ag$: Ag, 51.7.
Calc. for $C_8H_{15}O_2Ag$: Ag, 43.0.

The volatile acids appear to be a mixture consisting of formic, acetic, valeric, with higher ones probably lauric, and an unsaturated acid $C_{10}H_{18}O_2$. Whether any of the intermediate members of this series (caproic, caprylic and capric) are present, it is impossible to state.

Examination of The Non-Volatile Fatty Acids.—The acid mixture which had been steam distilled as above described was cooled and extracted with ether. From the dried solution the ether was removed and a residue of fatty acids weighing 28 Gm. was obtained. It was distilled under diminished pressure (15 mm.) and five fractions made: (I) boiling at 130–178°; (II) 178–198°; (III) 197–240°; (IV) 240–258°; (V) 258–265°. These amounted to 1.8; 4.0; 15.3; 3.4; and 1.5 Gm. respectively. The upper three fractions were united and found to have an iodine number of 60.6.

The presence of a small amount of low boiling acids in fractions (I) and (II) indicated the incomplete removal of volatile acids in the previous steam distillation or rather the presence of acids whose volatility lies midway between the two distinct groups.

The low boiling acids were twice systematically distilled and four fractions made (15 mm.).

Fraction (I) (B. p. up to 153°) very small quantity.[1]

Fraction (II) (B. p. 153–159°). This fraction was collected with reference to the boiling point of capric acid, but analysis indicated that the acid is not $C_{10}H_{20}O_2$.

Calc. for $C_{10}H_{20}O_2$: C, 69.8; H, 11.6.
Found: C, 71.0; H, 10.9.

This fraction when dissolved in aqueous solution of sodium carbonate instantly reduced potassium permanganate solution in the cold and the presence of a quantity of unsaturated acid is thus shown.

Fraction (III) (B. p. 159–170°). This was likewise unsaturated.

0.2622 Gm. subst. required 27.78 cc *N*/20 alkali for neutralization. M. wt., 188.7.
Calc. for $C_{10}H_{18}O_2$, 170; for $C_{12}H_{24}O_2$, 200.

Fraction (IV) (B. p. 170–179°). Analyzed as follows:

Calc. for $C_{10}H_{18}O_2$: C, 70.6; H, 10.6; Iodine No., 149.4.
Calc. for $C_{12}H_{24}O_2$: C, 72.0; H, 12.0.
Found C, 71.0, 71.2; H, 10.9, 11.0. Iodine No., 109.

This appears to correspond best to a mixture of 73% $C_{10}H_{18}O_2$ and 27% of $C_{12}H_{24}O_2$ (Lauric acid).

The higher boiling fractions were united with the acids that occurred free in the pollen and a quantity amounting to 25 Gm. was converted into the lead salts,

[1] Indicates lack of capric, caprylic and caproic acids.

which were dried and digested with ether. The lead salt soluble in ether yielded 9.2 Gm. liquid acids amounting to 36.8%. These were distilled at 15 mm. pressure and four fractions collected. (1) 148–200°; (2) 200–220°; (3) 220–241°; (4) 241–270°. The iodine numbers were (1) 101.3; (2) 92.4; (3) 144.7; (4) 140.0.

The third fraction which represented most of the liquid acids distilled chiefly at 228–238° and when analysed gave values corresponding with those required by a mixture of oleic and linoleic acids.

Calc. for $C_{18}H_{34}O_2$: C, 76.6; H, 12.1; Iodine No., 90.1.
Calc. for $C_{18}H_{32}O_2$: C, 77.1; H, 11.4; Iodine No., 181.4.
Found C, 76.9; H, 11.6.

The solid acids prepared from the lead salts insoluble in ether, which amounted to about 15 Gm. showed an iodine number of 11.8. These were dissolved in absolute alcohol and the solution gradually concentrated but no separation of the more insoluble fatty acids took place. The first fraction separated from quite concentrated solution, melted at 52–54°, and appeared to be impure palmitic acid, but there was no indication of the presence of stearic acid.

Calc. for $C_{16}H_{32}O_2$: C, 75.0; H, 12.5; N. V., 219.1.
Calc. for $C_{18}H_{36}O_2$: C, 76.1; H, 12.7; N. V., 197.5.
Found C, 74.6; H, 12.5; N. V., 203.9.

The presence of lower members of the series is evident. The acids were therefore esterified and distilled and a quantity of the esters distilled over below 180° at 20 mm. pressure. The free acids prepared from this fraction melted at 38–41°. The main fraction boiled at 180–200° which indicates a fraction consisting essentially of palmitic ester but containing nevertheless some lower members.

The fraction having the boiling point of palmitic ester (200–205°) was saponified. The acid melted at 50–52°, and upon analysis gave values agreeing closely with palmitic acid. (C, 75.0; H, 12.6; N.V., 207.)

The fraction boiling at 205–210° upon saponification gave an acid melting at 51–53°, and indicates perhaps the presence of a small amount of stearic acid.

The quantity of ester distilling above 210° was small. The solid acids obtained consist therefore of a mixture of palmitic with lauric, and very probably myristic acid and a trace of stearic acids.

B. THE ALCOHOL EXTRACT.

After exhausting with ether, the pollen (1150 Gm.) was percolated with alcohol and the percolate was concentrated to a volume of 3150 cc.

Pollen Phosphatide.—An aliquot (605 cc) was concentrated to a volume of 60 cc and completely precipitated by the addition of 500 cc of ether. A heavy yellow precipitate separated. The clear yellow supernatant solution was decanted and the ether was removed in a vacuum. The residue was treated with 200 cc of ether, and after 24 hours the mixture was filtered. The clear filtrate was again concentrated and redissolved in about 200 cc absolute ether and a trace proved insoluble. The ether solution was clarified by centrifugation and then washed with water, and dried over sodium sulfate. The dried solution was concentrated to a volume of 10–20 cc and mixed with acetone (400 cc). On standing and centrifugation the phosphatide separated as a yellowish-brown butter-like mass.

The precipitate was dissolved in warm ether and the solution made quantitatively to 200 cc. (Slightly turbid.)

20 cc contained 0.0703 Gm. dissolved solids. 20 cc gave 0.1848 Gm. $PbMoO_4$ = 1.275 mg. P.

As this (0.006%) is less phosphorous than was calculated from the previous[1] determination, the acetone filtrate was examined, being made quantitatively to a volume of 500 cc.

25 cc gave 0.5508 Gm. dissolved solids. 25 cc gave 0.0662 Gm. $PbMoO_4$ = 0.457 mg. P.

The acetone precipitation therefore yielded a precipitate weighing 0.7 Gm. and containing 0.01275 Gm. P, while the filtrate contained 11.02 Gm. and contained 0.0091 Gm. P, a considerable loss of phosphatide having resulted.

The crude phosphatide therefore contained about 1.8% P.

This phosphatide was further examined. A quantity of the ether solution (0.35 Gm.) was refluxed for 8 hours with 50 cc of 1% sulphuric acid after removing the ether. The fatty acids were extracted three times with ether, and the yield was 0.2476 Gm. (70.7%). These had an iodine number of 107.4.

The acid hydrolysis liquid when examined by the Walker-Munson process gave 0.0204 Gm. Cu_2O = 8.46 mg. dextrose = 2.4% of the phosphatide.

0.2812 Gm. phosphatide required 2.8 cc $N/10$ acid by Kjeldahl. N, 1.4%.

This phosphatide belongs to the same class as those from the pollens of *Alnus viridis* and *Pinus montana* described by Winterstein and Hiestand.[2]

The Resin.—The main part of the alcoholic extract was not used for the preparation of the phosphatide. To this main part was added the many by-products from the above described preparation. The whole solution (4 l.) was concentrated further and then poured into water and as the separation was unsatisfactory, the remainder of the alcohol was distilled off. The aqueous layer was syphoned from between the floating oily resin and the precipitated resin. It required centrifugation. The resin was washed with water, the washings being added to the original water solution.

The resin was dissolved in alcohol and the solution was poured upon purified sawdust and thoroughly dried. It was extracted as follows:

Petroleum ether (40–60°)	43.6 Gm.
Ether	1.2
Chloroform	3.7
Ethyl Acetate	20.1
Alcohol	32.5
Total	101.1 Gm.

Petroleum Ether Extract.—This solution (43.6 Gm.) consisted chiefly of fat, and it was studied in parallel with the primary ether extract of pollen, with special reference to the unsaponifiable material. There was added to it 53 Gm. of the ether extract obtained from further quantities of pollen. This work has been previously reported.[3]

[1] 0.026 % P.

[2] *Z. physiol. Chem.*, 54, 228 (1908).

[3] *Loc. cit.*

The Ether Extract (1.2 Gm.) upon standing separated a small amount of colorless substance which was not phytosterolin but a resin acid of indefinite melting point. A part of it was titrated but the deep orange color interfered with the phenolphthalein end-point.

0.1012 in alcohol required 5.27 cc 0.05 N alkali. M. wt., if monobasic, 376.

It was hydrolysed with 10% sulphuric acid in dilute alcohol and was found to be not glucosidic, and nothing of interest resulted.

The ethereal filtrate was extracted with the usual alkaline solvents but yielded nothing except to 10% potassium hydroxide which extracted it almost completely. This product was a resin.

The Chloroform Extract (3.7 Gm.) separated a small quantity of a substance which proved to be exceedingly soluble in alcohol but uncrystallizable. It melted at approximately 100–120°.

The filtrate when extracted yielded most of its material to the potassium carbonate solution and upon acidifying only amorphous material separated.

The Ethyl Acetate Extract of the Resin (20.1 Gm.) upon concentration and prolonged standing separated 1.7 Gm. of a white poorly formed product that softened at 190° and decomposed at about 202° with effervescence. It was practically insoluble in boiling alcohol, pyridine or ethyl acetate and was therefore an alteration product of the nature of a phenolic resin being readily soluble in alkalies.

The clear yellow filtrate was further concentrated and a further indefinite separation gradually accumulated. The filtrate was subjected to an acid and an alkaline hydrolysis without positive results. It proved to be non-glucosidic.

The Alcoholic Extract of the Resin (32.5 Gm.) was concentrated and permitted to stand in a vacuum desiccator whereupon it failed to crystallize and went to a varnish. When this alcohol extract was boiled with water, the resin melted to an oil and floated upon the surface. Upon attempting to redissolve it in alcohol a quantity of an alteration product (1.0 Gm.) remained insoluble. It softened at 161° and decomposed at slightly higher temperatures. Upon concentrating 16.3 Gm. further separated that softened at 152° and effervesced at 170–180°. This was difficultly soluble in alcohol but failed to crystallize.

This material dissolved in alkali forming an intensely yellow solution (Acid No., 161–207; Saponification no., 246–271).

The alcoholic filtrate was boiled with a quantity of sulphuric acid in dilute alcohol (to make the solution 5%), but no evidence of the formation of sugars was found. Nothing crystalline was found in the reaction mixture.

Examination of Water Soluble Constituents of Alcoholic Extract.—The solution (5 l.) was concentrated under diminished pressure to about 500 cc and a small amount of resin separated. This was added to the main resin fraction.

The solution was ether extracted. The ether extract was shaken with solutions of ammonium carbonate, potassium carbonate and potassium hydroxide. The last solvent extracted 2–3 Gm. of a resin which had the appearance of the resin acid obtained from Sumbul.

The aqueous solution was now completely precipitated with lead subacetate solution and the yellow glucosidic coloring matters consisting chiefly of glucosides of quercitrin and isorhamnetin[1] were thus isolated.

[1] Loc. cit.

The filtrate from the yellow lead salts was divided into two equal parts and the first half was freed from lead with hydrogen sulphide and concentrated to a small volume and allowed to stand in a desiccator but nothing crystalline resulted.

The residue was taken up in 5% sulphuric acid and the bases precipitated as phosphotungstates in the usual manner. The bases were liberated by the method of Wechsler and finally obtained in a slightly acid (nitric) solution from which the purines were precipitated with silver nitrate.

These silver salts were digested with ammonia water and divided into two parts: (*a*) those soluble in ammonia and (*b*) purine silver salts, insoluble in ammonia.

The part soluble in ammonia could not be identified but very probably consisted of guanosin. The systematic examination[1] of (*b*) yielded 0.3 Gm. adenin picrate m. p. 277–282°.

The filtrate from the purine silver salts was examined by the method of Kossel and Patten, but there was not enough histidin or arginin present for identification. The histidin mercury fraction contained 12 mg. nitrogen and gave Pauly's test, while the insignificant arginin silver fraction contained only 4 mg. nitrogen.

The Lysin Fraction was reprecipitated with phosphotungstic acid and the bases recovered in the usual manner. The solution was concentrated to a small volume and diluted with alcohol. Upon subsequent concentration to 10–15 cc a colorless crystalline mass (5.1 Gm.) separated. It decomposed at 298°.

Calc. for $C_6H_{11}O_2N$: C, 51.4; H, 9.4.
Found C, 51.1; H, 9.4.

It is therefore evident that the nitrogenous constituent of pollen, soluble in alcohol is largely betaine.

The hydrochloride decomposed with effervescence at 236–238°. It was fractionally crystallized.

Calc. for $C_6H_{11}O_2N.HCl$: Cl, 23.1.
Found (I) 22.85; (III) 22.7.

When nothing could be further isolated by direct crystallization the filtrates were allowed to desiccate completely and were boiled with large volumes of absolute alcohol until practically the entire material dissolved. Magnificent crystals of sucrose separated that decomposed at about 188° and were optically active $[\alpha]_D = +66.5°$.

Calc. for $C_{12}H_{22}O_{11}$: C, 42.1, H, 64.
Found C, 42.15; H, 6.3.

Another portion of the filtrate from the lead salt (1/4) was freed from lead with hydrogen sulphide and the filtrate from the lead sulphide was concentrated (finally in the presence of $CaCO_3$) to a small volume and then aliquoted into three parts, equivalent respectively, to 4, 33.5, and 250 Gm. portions of pollen.

EXAMINATION OF SYRUP BY BOURQUELOT'S BIOCHEMICAL METHOD.[2]

Pollen was shown to contain sucrose (0.4%) and the good agreement of the methods indicates no interfering sugars. The directly reducing sugar is levulose which was present (0.5%); β glucosides are absent.

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[1] Jones, "Nucleic Acids," page 95 (1914).

[2] *Archiv. d. Pharm.*, **245**, 172 (1907). "Handbuch d. Biochem. Arbeit," VII, 766.

The following analysis was accompanied by proper controls.

(*a*) *Direct.*—The syrup (equivalent to 250 Gm. Pollen) + 6.25 cc 0.5 *N* sodium phosphate solution + hydrochloric acid (final acidity = 0.001 *N*) and thymol water q.s. to 250 cc. Rotation in 2 dcm. tube at 26° = + 0.52° V. Walker-Munson process. 5 cc gave 0.0565 Gm. Cu_2O. Levulose, 0.5%.

(*b*) *Action of Invertase.*—200 cc of the above solution + 0.25 Gm. active invertase. Readings at 24 hour intervals in 2 dcm. tube at 26° is constant at —1.55° V. 5 cc gave 0.1024 Gm. Cu_2O. Sucrose by reduction is 0.39%. By Clerget's formula it was 0.40%.

(2) Calculated to normal solutions, the direct rotation is 0.135° V and the calculated rotation for sucrose is 0.4° V. Hence the other sugar is levorotatory.

(*c*) *Action of Emulsin.*—100 cc of the above solution was plunged into boiling water-bath for 10 minutes. The solution was cooled to room temperature and 0.5 Gm. active emulsion added. After 3 days no increase in the reducing power was observed. 5 cc gave 0.1032 Gm. Cu_2O. The reading, which was obscure in 2 dcm. tube at 27°, was —1° V.

Pentose sugars could not be detected. The remainder of this material (33.5 Gm.) was treated with phenylhydrazine hydrochloride and sodium acetate and a yield of d. phenylglucosazone (0.12 Gm.) melting at 208° was obtained.

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COLOR STANDARDIZATION IN THE U. S. PHARMACOPŒIA.*

BY E. N. GATHERCOAL.

Color perception is due to the appreciation through the retina of light waves of differing wave lengths. The spectrum of white light is the physicist's basis of color study, but in nature colors are developed that are of greater intensity and clearness than the spectrum of white light displays.

The color of opaque or partially opaque objects is due to the absorption of all the color waves falling on the object, except those particular colors which are reflected from the object and can thus be received by the eye. The color of transparent objects, solid or liquid, results from the transmission through the object of those colors seen by the eye and the absorption of any others that may be present. The color of flaming gases is due to the actual production of certain color waves which may then be perceived by the retina. One can readily understand, therefore, that a color chart prepared with opaque pigments might be more valuable for determining the color of opaque objects than for matching the color of a transparent object or a flaming gas. This is true perhaps to a limited extent.

The three Primary colors—yellow, red and blue, as indicated in chart I[1] are called primary because they are the basis of all other colors. In the white light spectrum these three colors cannot be seen with the intenseness and clearness displayed by the pigments used in this chart. However, by the sodium flame it is possible to produce an intense yellow, by the lithium a brilliant red, etc.

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* Scientific Section A. Ph. A., Cleveland meeting, 1922.

[1] The charts were displayed during the reading of the paper.

By mixing equal parts of any two primary color pigments it is possible to produce a third color, and in this way the binary colors—orange, green and violet, are formed as indicated in chart II[1].

While the six colors here presented[1] form the color basis of a great many objects it soon becomes evident in color study that relatively few objects exactly match any one of the six colors on chart II. We find in nature a great range of color "value," the intensity varying from a high degree of "lightness" to an intense "darkness" of the color. Many attempts have been made to name or describe the intensity of colors, but no scheme so far presented is perfect. It is customary to select a middle point half way between White and Black; the color intensity that falls at this middle point is known as "Normal" while those intensities between Normal and White are called "Tints" and those between Normal and Black are "Shades." The term "Tone" includes all Tints, Shades and Normal of a color. Tints are made by the addition of opaque white to Normal, or with water colors, dilution with water. Shades are made by adding black to Normal. Therefore, theoretically, an unlimited number of tints and shades of any color can be prepared, but, practically, it requires high training in color perception to distinguish more than ten tints of color or as many shades. Even ten tones, ranging from a light tint to a dark shade gives a fairly fine gradation of color intensities. See charts III[1] and IV[1].

In the study of Binary colors it is noted that each Binary is produced by mixing equal parts of two Primaries. The third Primary, *i. e.*, the one that does not enter into the Binary, is said to be Complementary to the Binary. Orange is a mixture of yellow and red in equal proportions. Blue does not enter into it and is therefore the one thing lacking to complete the Color circuit. Therefore orange and blue are each complementary to the other. Complementary colors are in the strongest possible contrast to each other, yet when placed in juxtaposition remarkably enhance each other's values. However when mixed in equal proportions they produce no tone or hue of either color but a gray—Neutral Gray. If a larger quantity of one complement be used, its color will be apparent, but "softened" or "grayed." By varying the proportions of the complements in the mixture, and by adding white or black varying degrees of grayness can be produced. Here again, theoretically, an unlimited number of grayed tones are possible, but, practically, the limit of differentiation for the untrained eye is about ten of these tones.

In addition to that quality of color known as the tone or intensity, and that peculiarity of color known as softening or graying, we have a third quality of color to consider, namely "Hue." It is Hue that makes one color distinguishable from another. The three Primary colors give us the Primary Hues. The Binaries are hues produced by mixing equal parts of any two Primaries. It is evident that by varying the proportion of the Primaries or by mixing equal parts of a Primary and an adjacent Binary, new hues can be formed. Thus a mixture of three parts yellow and one part red equals yellow-orange, while a mixture of three parts red and one part yellow gives red-orange. Likewise three parts of red and one of blue gives red-violet and three parts of blue and one of red gives blue-violet. In a similar manner with blue and yellow, blue-green and yellow-green are formed. It is evident, also, that by combining yellow and yellow-orange, yellow-yellow-

orange will be formed. Theoretically, there is no limit to the hues that can be produced, but practically there is a limit, for the distinction between the tones of a color similar to the closely adjacent hues is too slight for the untrained eye to grasp. Thus the difference between a light tone of yellow-orange and yellow-yellow-orange is very slight. The twelve hues shown in chart VII[1], the three Primary, the three Binary and the six Secondary and Neutral Gray with their tones, brilliant and grayed, afford as minute a differentiation of color as the ordinary mind can grasp.

It is evident that nothing approaching a complete color scheme is feasible, but a serviceable selection of type colors would be practicable.

In such a color chart proposed for the U. S. Pharmacopœia, the twelve hues and neutral gray could be arranged in thirteen columns and a fourteenth column could be used to gather into one place the various tones of "brown." The so-called brown tones are scattered through the yellow-orange, orange and red-orange columns. There should be about ten tones of each hue, part brilliant and part grayed. This would give 130 color tones, every one of them produced scientifically and properly named. The range of color is complete. The division into hues and tones could be made finer, but it is here fine enough for all practical purposes.

Some of the advantages of such a chart may be stated as follows:

First—It supplies a standard color *nomenclature;* a nomenclature adopted and used wherever color is scientifically considered. This nomenclature is also generally used in the schools in connection with color and art work. Also, it is gradually being adopted by color makers to replace the cumbersome color nomenclature that has been built up by color manufacturers.

The color nomenclature of the U. S. P. IX cannot be considered scientific though in most cases it is fully descriptive. For instance in the monograph on Aloe, the following color terms are employed:

Yellowish brown, 3 times	Yellowish, 2 times
Blackish brown, 3 times	Pale yellow
Dark brown	Greenish yellow
Reddish brown, 5 times	Bright yellow
Deep reddish brown	Purplish red
Light brown	Deep red
Purplish brown	Deep rose
Greenish	Orange
Green	Olive-black

A second great advantage of such a chart is that it supplies a standard color *guide.* While it may be true that persons with a color training would know just what was meant by deep rose, there are many readers of the U. S. P. including myself who are not so well trained. For instance the color produced in making the test for emodin in Aloe is named as deep rose. My results, uniform with many samples of Aloes, was a pink. Lighter red in the color chart almost exactly matched the color produced in this reaction. If a color chart were in U. S. P. IX and the color in the test had been named according to the chart, I would have known at once whether the results of my test were at the U. S. P. standard.

Finally, we need a standard color nomenclature and a standard color guide because color terms are so extensively used in the Pharmacopœia and color de-

scriptions are of such great importance. As a student of the Pharmacopœia for a number of years, I have appreciated as most of you do that color terms are not rare in the U. S. P., but I had no conception until after investigation how *numerous*, *varied* and *important* color terms are in pharmacopœial description. Do you know that color terms are used 3,000 times in U. S. P. IX? In the first 50 pages of descriptive text, 84 color terms are employed a total of 302 times.

In conclusion permit me to reply to a few of the criticisms offered against the introduction of a color chart into the U. S. P.

Question.—Can lithographed charts be printed in large quantities so that all the charts will have the same intensity of color?

Answer.—The chart proposed for the U. S. P. will be made from paper dyed in liquid dye in a vat, sufficient paper being dyed at one time with the one lot of color to supply all the copies of this revision that can possibly be sold. After each color has been thus dyed into paper, small rectangles will be cut, very much as labels are cut and each rectangle of colored paper will be mechanically attached in its proper place to the heavy paper used for the chart. There can be no question about the absolute uniformity of colors in every chart, even though 100,000 or 200,000 be prepared.

Question.—Will the colors not fade?

Answer.—The colors are as permanent as can be obtained. They might fade with long exposure to sunlight. However, the chart should be bound into the book and sufficient exposure to cause fading of the colors will be a rarity. There is much more likelihood of their becoming soiled by constant use. Provision will be made for the purchase of additional charts by those who need them.

Question.—Is color of sufficient importance to warrant this innovation?

Answer.—The use of color terms 3,000 times in U. S. P. IX certainly indicates that color descriptions are of value.

Question.—Should color be made a criterion of vegetable drugs? Do not drugs vary much in color without affecting their value or virtue? Is color a true index to quality?

Answer.—Color is just as valuable a criterion of the identity, purity and value of vegetable drugs as is size, shape, external markings, structure, odor or taste. If it is desirable to eliminate the descriptions of drugs entirely then color description might also be eliminated. Even then, however, about two-thirds of all color terms now employed in the Pharmacopœia are used in connection with the chemical monographs. Hence even with the elimination of all vegetable drugs a color chart would still be desirable.

Question.—Will it not be difficult to exactly match the colors?

Answer.—It will, but an approximate match is better than no match at all.

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THE PHLOBAPHENES.*

BY MORITZ DITTMAR.

In the year 1844 two German chemists, Stähelin and Hofstetter, made the observation that when plant extracts containing tannins were heated or treated with acids, brown or red brown substances separated out to which they gave the name phlobaphenes. The word phlobaphene is derived from two Greek words meaning bark and color. Stähelin and Hofstetter however further noted that the phlobaphenes were not only to be found in the bark but also in fruits, seeds and other parts of the plant.

The naming of a group of substances is a comparatively easy matter. Their exact chemical identification and study is generally more difficult. The phlobaphenes have proved no exception to this proposition.

During the years following the first observations of the latter substances, chemists have not concerned themselves to any great extent with them. The reasons for this are fairly evident. The phlobaphenes are derived from the tannins through certain changes which the latter undergo. These changes will be discussed later on.

It would be natural to expect that chemists would rather busy themselves with the more simply constructed tannins than the complicated end-products, the phlobaphenes. But the practical reason why the attention of chemists has been concentrated upon the tannins is their great economic importance which the phlobaphenes do not possess.

With their study of the tannins scientific investigators have had their hands amply full. The problem of trying to answer the question. "What is a tannin, chemically and physiologically considered?" has been no easy one. Up to the present day no absolutely satisfactory answer has been found. Scientists of equal eminence and standing differ widely in their views. It required the full genius, of that master chemist Emil Fischer to synthesize penta-methyldigalloyl-glucose, now almost universally accepted as a tannin corresponding to the natural tannin of nutgall. Even here a few dissenters will be found.

The phlobaphenes are so intimately related to the tannins that a brief consideration of the latter in the light of our present knowledge is necessary before arriving at an understanding of the phlobaphenes.

There have been many classifications of the tannins made. Most of these have been unwieldy and complicated.

Prof. Henry Trimble of the Philadelphia College of Pharmacy made an interesting classification of the tannins based on the results of their elementary analyses. Thus he found that the tannins fell into two groups. In the first group he placed those tannins which upon combustion yielded 52 per cent. C. This group, called the nutgall tannin group contains the tannins from nutgalls, chestnut leaves, and pomegranate. The members of the second group called the oak-tannin group, includes tannins from oakbark, mangrove, canaigre, rhatany and kino.

To my mind the best classification of the natural tannins is that of Karl Freudenberg. He divides, like Trimble, the tannins into two groups.

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* Read before New York Branch A. Ph. A., April Meeting, 1923.

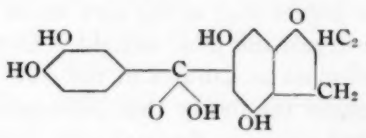
In the first group he places those tannins in which a number of benzol nuclei are united over oxygen to form a complex compound. In this group would fall the so-called depsides of Emil Fischer which are formed by the inter-reaction of two or more phenol or oxyaromatic acids. The simplest depside is the digallic acid which for a long time was believed to correspond to the natural tannin of nutgall. This view predominated until the synthesis of penta-methyldigalloyl-glucose by Emil Fischer. The dominant phenolic component in this group is gallic acid.

However caffeic acid, which is a dioxycinnamic acid, is present to a certain extent in members of this group. Chlorogenic acid which is the mother-substance for the coffee tannins represents a compound containing a caffeic acid and quinic acid nucleus. A group characteristic is the ease with which ferments such as emulsin and tannase split these tannins into their component parts.

The second group of tannins is designated by Freudenberg as the group of condensed tannins. In this group the benzol nuclei are united by carbon atoms. These tannins are not broken up into simpler components by the action of ferments. They are nearly always precipitated by bromine. Through the agency of heat, oxygen, or acids, the tannins of this class go into the form of amorphous, so-called tannin reds or phlobaphenes. Phlobaphenes are then products of the tannins of this group.

This second group is further subdivided into two groups. The tannins of one sub-group contain a phloroglucin nucleus, those of the second sub-group do not. Both sub-groups are characterized by the common tendency to precipitate with bromine and to go over into the phlobaphene stage. This group of tannins is economically the most important.

Gambir tannin is a tannin of great economic importance. It is derived from a crystalline, colorless mother substance, gambir catechin. If gambir catechin is heated it is transformed into colored amorphous gambir tannin. If the gambir tannin is further heated a gambir red or phlobaphene results. Thus in the case of gambir we have a progression from a crystallizable colorless substance, a prototannid, to the amorphous deeply red or red-brown colored phlobaphene. The formula of gambir catechin as given by Kostanecki is the following:



After this brief consideration of the tannins we may proceed to a more detailed discussion of the phlobaphenes themselves. Chemical literature dealing with the tannins is rich and plentiful, but as little attention has been paid to the phlobaphenes, the phlobaphene literature is accordingly scarce and unsatisfactory.

Freudenberg's definition of the phlobaphenes as being the water-insoluble deeply colored products of the oxidation or condensation of tannins, which result through the agency of dry heat, hot water, diluted acids or the oxygen of the air is the most satisfactory one to be found.

Kunz-Krause's definition of the phlobaphenes as being the red or red-brown amorphous substances found in the outer cellular layers of the bark is an older and less satisfactory one.

A point of confusion when reading literature dealing with the phlobaphenes is the uncertain usage of the expressions phlobaphene and tannin red. Some authors will use both interchangeably. Thus Etti in his work with oak tannin, differentiates between an oak-tannin red and an oak phlobaphene. Böttinger on the other hand who studied the same substances regarded both as identical.

Dekker made the suggestion of calling all the phlobaphenes Reds. In the German literature the word "Rot" is very often used to designate the red-colored oxidation or condensation products of the tannins. But if this suggestion was carried out, we would have to call a lot of substances "Reds" which were really of brown color. The simplest thing to do would be to retain the name phlobaphene which, after Freudenberg, includes the condensation or oxidation products of the tannins, and regard the so-called reds as red-colored phlobaphenes.

Another question of dispute among various investigators is the one having to do with the manner of formation of the phlobaphenes. All are agreed that the phlobaphenes are products of the tannins. But the manner in which the tannins are converted into phlobaphenes has led to different views. There are two main theories concerning the formation of the phlobaphenes—the oxidation theory and the dehydration theory.

According to the oxidation theory the phlobaphenes are simply the result of an oxidation of the tannins. This oxidation can take place directly through the agency of the oxygen of the air, or with the aid of oxidizing ferments found in the plants themselves.

According to the dehydration theory water is split off by condensing tannins, anhydrides of the tannins resulting, which constitute the phlobaphenes. This anhydridization of the tannins can be progressive as Etti showed, by treating oak-tannin with sulphuric acid under varying conditions. He obtained amorphous red-colored phlobaphenes of the composition $C_{20}H_{36}O_{16}$, $C_{20}H_{34}O_{15}$ and $C_{20}H_{32}O_{14}$. The three differ progressively by one molecule of water.

Kunz-Krause does not believe that the phlobaphenes of the bark result from an oxidation process. He argues that in the cork tissue which is richest in phlobaphenes, the cells are the dryest and most airtight. He remarks that the localization of such a sensitive alkaloid as Curarin in the cork alongside of phlobaphene masses, is an argument against the theory that phlobaphenes result from an oxidation process. If oxygen had access to the cork cells, such an unstable alkaloid as curarin could no longer be detected.

Tschirch (1891) advanced the proposition that the red-brown coloring of the cell walls of the barks of many drug plants as cinchona and cinnamon, resulted from an absorption of the prototannids from the cell contents. These were then oxidized while in the membrane, to the red-colored phlobaphenes. Tschirch made the observation that when fresh cinchona bark or cola nuts were subjected to a steam sterilization the reddening of the cell walls did not occur. Ordinarily, without steam sterilization a freshly removed cinchona bark will redden in 15 to 20 seconds. This observation led Tschirch to believe that enzymes (oxidases) played a rôle here.

Lindet (1898) supported Tschirch's observations. He observed that a steam sterilized apple would not turn brown when cut. The preparation of green tea by heating supports this theory also.

Tschirch divides the phlobaphenes into two groups. The phlobaphenes of the first group are formed during the life of the plant. These are to be found as part of the cellular contents. They build red-brown or brown masses and are particularly localized in physiologically dead tissue.

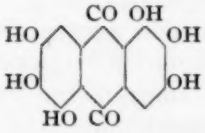
The phlobaphenes of the second group are formed postmortally and are especially to be found in the cell membranes. Tschirch calls these the "membrane phlobaphenes." Since the membranes which contain the postmortally formed phlobaphenes were originally colorless, we can account for the coloration as follows:

The soluble tannin penetrates from the cell into the cell membrane and is there oxidized to phlobaphene. It is possible that the tannin penetrates the membrane in the form of a glucoside. However it is not necessary to presuppose the existence of a glucoside.

There are a great many drugs whose red or red-brown color is due to postmortally formed phlobaphenes. Some of these are, cinchona, cinnamon, sassafras, oak and quebracho barks, rhatany, rhizome of male fern and tormentilla, cola nuts, and cloves.

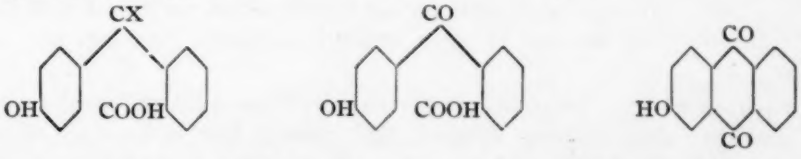
Next to nothing is known of the exact chemical structure of the phlobaphenes. Through the application of strong reagents products are obtained which give us only a comparatively poor idea of their real constitution. Thus by fusion with potassium hydroxide products such as phloroglucin, protocatechuic acid, acetic, and butyric acids are obtained. But by such destructive methods, not very much of the inner structure of the phlobaphenes can be learned.

Nierenstein was of the opinion that the phlobaphenes might possibly be constructed similar to ruffigallic acid.



In this case the phlobaphenes would be anthracene derivatives. Nierenstein subjected the phlobaphene from Quebracho-tannin to a distillation with powdered zinc. He actually obtained anthracene.

Nierenstein and Webster formulated the formation of phlobaphene from mangrove tannin as follows:



The tannin is first oxidized to the alpha-phlobaphene 2, which latter goes over into beta-phlobaphene upon further oxidation. By distilling the phlobaphenes 2 and 3 with zinc dust, diphenyl and anthracene were obtained respectively.

Dekker subjected a phlobaphene from *Eucalyptus occidentalis* to a similar reducing distillation and obtained thereby diphenyl.

At the Pharmaceutical Institute at Berne under the guidance of Professor Tschirch, I made a comparative study of a number of phlobaphenes obtained from drugs. I will briefly describe some of the work which we did.

The following phlobaphene-containing drugs were examined: Krameria, Tormentilla, Bistorta, Cinnamon Bark, Cinchona, Cloves, Kola Nuts and Horse-chestnut Shells.

The method of obtaining the phlobaphenes is the following one. The coarsely ground drug was percolated with distilled water after the method of interrupted percolation. The percolation with water was continued until the percolate ceased to precipitate with 1% hydrochloric acid. This precipitation took place either in the cold or was first induced by warming on a water-bath.

In the aqueous percolate the phlobaphenes are held in colloidal solution by the peptizing action of water soluble tannins. By the addition of a mineral acid this peptizing influence is destroyed and the phlobaphenes precipitate out. The latter may be then collected on a suction filter, washed free of mineral acid, and dried at 70° C. in a drying oven.

After filtering off the first phlobaphene precipitate an interesting observation is made in regard to the filtrates. In a short time the clear filtrate becomes cloudy. A second precipitate of phlobaphene occurs. If this is filtered off and the clear filtrate allowed to stand the same phenomenon is repeated. This reprecipitation is especially abundant in aqueous percolates obtained from the root of Krameria and the rhizome of Tormentilla.

This reprecipitation can be accounted for in the following manner. After the initial phlobaphene precipitate, the tannins which are in solution are acted upon by the mineral acid present and so condense to phlobaphenes. The latter being insoluble naturally precipitate out.

The initial precipitate is always a great deal less than the sum of the subsequent precipitates. Thus the phlobaphene precipitates of the first five aqueous percolates of 500 grams of Krameria weighed 9.189 grams. The weight of the phlobaphenes subsequently precipitating out during the course of one year equaled 31,386 grams. In the case of Tormentilla the subsequent precipitation was nearly five times as much as the initial precipitate.

In connection with the reprecipitation it was noticed that the color of each succeeding precipitate was darker than its predecessor.

The aqueous percolate of the rhizome of Bistorta represents a dark red colloidal solution. Upon the addition of dilute hydrochloric acid in the cold no precipitation occurs. Despite the presence of hydrochloric acid molds thrive readily in such a solution. This is readily accounted for by the fact that the rhizome of Bistorta contains an enormous amount of sugar which is naturally found in the aqueous percolate.

If such an aqueous percolate be permitted to stand several weeks with the molds, and then after filtering off the molds, allowed further to stand, it will be found that within a week a red amorphous precipitate of phlobaphene will precipitate out. If this be filtered off a reprecipitation in the filtrate will occur. This reprecipitation takes place several times.

It is possible in this case that the large amount of sugar present in the aqueous extract prevents the immediate precipitation of phlobaphene by the hydrochloric

acid. Only then when the sugar has to a certain extent been devoured by the molds can the precipitation proceed in a normal manner.

This explanation however sounds unsatisfactory when one considers that in fresh aqueous extract of Tormentilla a great deal of sugar is also found. Here however one obtains an immediate precipitation upon the addition of hydrochloric acid. This behavior may be due to a peculiarity in the structure of the Bistorta phlobaphene concerning which next to nothing is now known. Bjalobrsheski was able to obtain ellagic acid from Bistorta tannin by treating the latter with dilute hydrochloric acid. Now ellagic acid represents two benzol nuclei which are united not only by oxygen but also directly by carbon. This would place the Bistorta tannin, if we assume that ellagic acid is its nucleus, in a special class lying between the two groups of Freudenberg's classification.

When the fresh aqueous percolate of Bistorta is warmed on a water-bath with dilute hydrochloric acid a brownish precipitate of phlobaphene is immediately obtained.

After exhausting the various drugs with water, percolation with a dilute sodium hydroxide solution (1–1000) is carried out. The percolates are dark red in color and readily give a voluminous precipitate with hydrochloric acid. The phenomenon of reprecipitation does not take place with these alkaline percolates. This is easily accounted for. In the alkaline percolate the phlobaphenes are no longer held in solution by the peptizing action of soluble tannins. They are doubtlessly present as soluble sodium salts. Upon the addition of a mineral acid all the phlobaphenes would precipitate out at once and reprecipitation would not occur.

The phlobaphenes can also be salted out. By removing the electrolyte the phlobaphene goes into solution again. However if the electrolyte hydrochloric acid is used in precipitating the phlobaphenes, the latter are then practically insoluble in water.

If the Krameria is first subjected to a steam sterilization before percolating, some differences occur which are worthy of mention. In an experiment with equal lots of Krameria the following differences were noted.

In the percolate of the sterilized drug the peculiarly aromatic odor present in the percolate of the unsterilized drug is missing.

The percolate of the sterilized drug is clear. That of the unsterilized drug is somewhat cloudy.

If the percolate of the unsterilized drug is exposed to the air molds develop on its surface in a short time. The percolate of the sterilized drug does not develop mold colonies when exposed to the air. Even when infected with molds the percolate from a sterilized drug does not permit their growth. This would indicate that the drug contains some volatile odorous principle which perhaps supplies nourishment for molds. This volatile substance is removed by a steam-sterilization of the drug.

That the tannin of Krameria has antiseptic properties and justifies the usage to which the natives of Peru have put it for many centuries, namely as a preservative of the teeth and as a mouth wash and gargle, is indicated by the fact that molds cannot grow in its aqueous solution.

The yield of phlobaphene from the aqueous percolates of the sterilized drug

is less than that from the unsterilized drug. The yield from the combined aqueous percolates of 500 grams of sterilized Krameria equalled about 76 per cent. of the yield obtained from the same quantity of unsterilized drug. The yields from the first thirty alkaline percolates of each were quite similar being for the unsterilized drug 13.87 per cent. for the sterilized drug 13.56 per cent. of the total weight of the respective drugs.

Doubtlessly, in the steam sterilization of the drug, the heat of sterilization affects part of the water-soluble tannin converting it into an insoluble condensation product of phlobaphene nature.

The following table shows the yield of phlobaphene from several phlobaphene containing drugs.

	Weight of drug.	Phlobaphene ppt. aqueous extract.	Per cent.	Phlobaphene ppt. alkaline extract.	Per cent.	Total Per cent.
Krameria	500 Gm.	41.8 Gm.	8.36	90.1 Gm.	18.02	26.48
Tormentilla	1000 Gm.	95.7 Gm.	9.57	92.2 Gm.	9.22	18.79
Bistort	1000 Gm.	41.1 Gm.	4.16	103.74 Gm.	10.37	14.53
Cinchona (red)	300 Gm.	0.73 Gm.	0.26	34.4 Gm.	11.46	11.72
Cinnamon	300 Gm.	3.12 Gm.	1.04	11.65 Gm.	3.88	4.92

The phlobaphenes may be reduced. Experiments in regard to the reduction of the phlobaphenes were carried out with powdered zinc in neutral, alkaline and acid alcoholic solution.

When a dark red, alcoholic solution of phlobaphene (the phlobaphenes from the eight drugs under examination acted similarly) is boiled with zinc dust, a nearly perfect decolorization takes place. This is however not due to a reduction of phlobaphene. The phlobaphene in alcoholic solution is adsorbed by, or enters into combination with the zinc. If the zinc residue is treated with dilute sodium hydroxide solution the latter leaches out the phlobaphene from the zinc and is colored red. Water or alcohol will no do this.

By boiling an alkaline alcoholic solution of the phlobaphene with zinc dust only a partial decolorization takes place. In this case again a combination with the zinc seems to have taken place and not a true reduction.

By boiling an acid alcoholic solution of the phlobaphene with zinc dust a real reduction is obtained. A dilute sulphuric acid is used. The boiling is carried out in a hydrogen atmosphere. The dark red solutions of the eight phlobaphenes permitted reduction to solutions of a faintly yellow color. If the still warm practically colorless solution of reduced phlobaphene is exposed to the air, after filtering off the zinc an interesting phenomenon is observed. In a very few minutes the solution becomes yellowish red in color. This color changes to a dark red and finally a dark brown-red.

On the other hand if the reduced phlobaphene solution is kept under a hydrogen atmosphere, no color change occurs. Solutions of the various reduced phlobaphenes were kept in this manner for over 24 hours.

This reduction experiment would indicate that the oxygen of the air is at least partly concerned with the formation of the phlobaphenes.

By simply adding water to an alcoholic solution of reduced phlobaphene, a greyish white precipitate is obtained which rapidly turns black-brown when ex-

posed to the air. I tried to obtain an ashless precipitate but succeeded in one case only, that of a reduced phlobaphene from Krameria. This precipitate was dried in a CO_2 atmosphere and combusted to determine the C, O, and H content.

In boiling the phlobaphenes with dilute sulphuric acid no splitting off of glucosidal sugar can be detected. Nor could any splitting off of a part of the phlobaphene structure be noted. But that the phlobaphenes do undergo changes when boiled with dilute sulphuric acid is evidenced by the color changes which the lighter colored phlobaphenes undergo.

For instance the phlobaphene from an aqueous percolate of Krameria is colored light yellow-brown. By boiling a half hour with dilute sulphuric acid (2%) the color is changed to a bright red. The dilute acid has also taken on a deep red color showing that part of the phlobaphene has gone into solution. Both the red colored phlobaphene and the red solution reduce Fehling's solution. Sugar is not present as indicated by a negative osazone reaction. The reduction of the Fehling's solution is due to the phlobaphene itself. If the latter is filtered off, the filtrate will in a few days grow cloudy and soon a deposit of red phlobaphene occurs. If the filtrate from this is allowed to stand, further deposition of red phlobaphene occurs. This deposition takes place several times.

This phenomenon can be accounted for as follows. By boiling the amorphous phlobaphene with dilute sulphuric acid the former, despite the fact that it is normally insoluble in an acid solution, enters into colloidal solution in a state of fine dispersion. But this highly disperse phase of the phlobaphene is unstable. The colloidal particles enter into large aggregates as shown by the initial clouding and final precipitation.

The effect of nitric acid upon the phlobaphenes was studied. Nitric acid of various concentrations and at differing temperatures was used. All the phlobaphenes from the eight drugs examined yield oxalic acid. In the case of a phlobaphene from Tormentilla, styphnic acid (tri-nitro resorcin) was obtained. From Krameria, in addition to the oxalic and styphnic acids, picric acid was found.

As was mentioned before, products such as phloroglucin, protocatechuic acid and lower fatty acids are obtained by fusion with potassium hydroxide. Going to the other extreme and boiling the phlobaphenes with dilute sodium hydroxide (2% and 5%) gives negative results. The structure of the phlobaphenes is resistent to such attacks.

A number of elementary analyses of the phlobaphenes were made. The phlobaphenes are not chemical individuals. Since we assume that the phlobaphenes are a result of a progressive oxidation or condensation of the tannins they cannot themselves be pure chemical substances. We must regard them as mixtures of substances of closely allied structure.

To set up a formula for such a substance is foolish. An elementary analysis has therefore only a relative value. It is, however, interesting to know in just what proportions the carbon, hydrogen and oxygen are present.

In preparing the phlobaphenes, for combustion, great difficulty is experienced in removing small amounts of inorganic matter which cling tenaciously to them. Salting out the phlobaphenes was tried but without success. As the phlobaphenes are but sparingly soluble in water, removal of impurities by simply washing with distilled water was successful in several cases.

Another method used was to dissolve the phlobaphene in alcohol. From its alcoholic solution the phlobaphene could be precipitated by the addition of slightly acidulated water.

The phlobaphenes so obtained were first dried in an oven at 70° C. and then kept in desiccators until their weight remained constant. The following figures representing the results of some of the combustions carried out show how widely the various phlobaphenes differ.

	%	%	%
Krameria	C 62	H 5	O 33
Tormentilla	C 59	H 5	O 36
Bistorta	C 57	H 7.8	O 38.2
Kola Nuts	C 56.7	H 5	O 38.3

The phlobaphenes are the end products of a large number of natural tannins. They are the last step in a long chain of transformations, starting with simple crystallizable substances and ending with an amorphous complicated condensation product.

In concluding it might be interesting to mention an economic value, if only an indirect one of certain phlobaphenes. The beautifully attractive brown color of chocolate is in great measure due to a phlobaphene derived from a tannin originally present in the fresh cacao seed. We know that in the fresh cacao seed an alkaloid-tannoglucoside is present which during the process of fermentation to which the seeds are subjected is broken up into its component parts. The tannin is oxidized by oxidases present to cacao-red. The oxidation is progressive, the end product being the brown colored phlobaphene.

ON 3-AMINO-4:4′-DIHYDROXYARSENOBENZENE AND ITS *N*-METHYLENESULPHINATE AND *N*-METHYLENESULPHONATE DERIVATIVES.*,†

BY MERRILL C. HART AND WILBUR B. PAYNE.

For the production of unsymmetrical arseno compounds three general methods are given in the literature. According to Bertheim[1] the reduction of equimolecular mixtures of two different arsinic acids or oxides, or a mixture of an acid with an oxide leads only to the production of the unsymmetrical derivative and not to a mixture of the three possible products. Limiting the reduction agent used to sodium hydrosulphite we find Fargher[2] describing the unsymmetrical compound 3′-amino-4′-hydroxy-1:3-diazole-5:1′-arsenobenzene by reduction of the acids. Christiansen[3] also produces by this method 3-amino-4:4′-dihydroxyarsenobenzene and 3-5-3′-triamino-4:4′-dihydroxyarsenobenzene. To test the purity of these compounds Christiansen relied on the solubility tests and the percentage of arsenic.

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* Contribution from the Laboratories of The Upjohn Company.
† Received for Publication June 19, 1923.
[1] *Chem. Zeit.*, 38, 756, 1914.
[2] *J. Chem. Soc.*, 117, 866, 1920.
[3] *J. Am. Chem. Soc.*, 43, 2202, 1921.

These unsymmetrical compounds are also said to be readily produced[1] by the condensation of arsines[2] with arsenoxides or chloroarsines. This reaction has also been used to prepare the mixed antimony and other complex derivatives.[3]

$$RAsH_2 + OAsR' \longrightarrow RAs = AsR' + H_2O$$
$$RAsH_2 + Cl_2AsR' \longrightarrow RAs = AsR' + 2HCl$$

By this method the following unsymmetrical arseno derivatives have been prepared; 4-amino-4′-hydroxyarsenobenzene, 3-amino-4-hydroxyarsenophenyl-4′-glycine and 3-amino-4-hydroxyarsenobenzene.

The third method for the production of these compounds is by the rearrangement of two symmetrical compounds to form the unsymmetrical. Karrer[4] has

$$RAs = AsR + R'As = AsR' \longrightarrow 2RAs = AsR'$$

observed this only in the case of two compounds basing his conclusion on a change in solubilities when the two symmetrical compounds were heated together at 70° to 80°.

From the examination of the patent literature we find that when mixtures of two arsinic acids are reduced, stannous chloride in the presence of strong hydrochloric acid is used. By this method 3:4′-diamino-4-hydroxyarsenobenzene[5] is produced. However where the arsenoxides were used sodium hydrosulphite was the reducing agent employed. By this means were produced[6] 3-amino-4-hydroxyarsenophenyl-4′-glycine, 3-amino-4:4′-dihydroxy-3′-5′-diaminoarsenobenzene, 3-amino-4-hydroxyarsenobenzene, 3-amino-4-hydroxyarsenobenzene, 3-amino-4-hydroxyarsenomethane,[7] and 3′:5′-dichloro-3-amino-4:4′-dihydroxyarsenobenzene.

We have found in the several cases studied that reduction of an equimolecular mixture of two arsinic acids does not uniformly give the unsymmetrical compound and that the production of these is a much more difficult problem than one would gather from a cursory survey of the literature. The production of unsymmetrical derivatives by this method is based on two assumptions that up to this time have not been definitely proven. One of these is that the rate of reduction of the two different acids is the same so that the production of RAs= equals the production of R′As=, otherwise there would be a piling up of the symmetrical compound of the acid which was reduced the more rapidly for the radicle RAs= cannot exist but momentarily in the free condition. However if the time element is long enough for complete reduction with different rates of reduction and the consequent production of mixtures of the three possible products it would be possible to produce the unsymmetrical derivative if the two symmetrical compounds had the ability to rearrange spontaneously under the conditions employed to form the

[1] Bertheim, "Handbuch. d. Org. Arsenoverb.," p. 162, 1913.
[2] Kahn, *Chem.-Ztg.*, 1099, 1912, D. R. P., 254,187, D. R. P., 251,571.
[3] D. R. P., 270,259.
[4] *Ber.*, 49, 1648, 1916.
[5] D. R. P., 251,104.
[6] D. R. P., 251,104.
[7] D. R. P., 253,226.

unsymmetrical. The rearrangement of compounds of this type has however only been studied in the two cases reported by Karrer.[1]

The observations of King[2] on unsymmetrical arseno compounds include the suggestion that the particular substance formed upon reduction is dependent upon the relative solubilities of the possible products so that in reducing a mixture of $RAsO_3H_2$ and $R'AsO_3H_2$ one would obtain RAs=AsR′ exclusively only if it were less soluble than RAs=AsR or R′As=AsR′. When aqueous hydrosulphite solutions are used for reduction these develop an acidity due to $NaHSO_3$ as the reduction proceeds so that the solution is neither basic nor yet strongly acidic and this will undoubtedly largely influence the nature of the products obtained.

For the preparation of this type of compound by reduction with hydrosulphite we found it advisable to use the oxides. These reduce almost immediately at room temperatures with the formation of the arseno compound. When the arsinic acids are used the reduction requires several hours at a temperature of 50° to 60°. It is our opinion that it is this rate of reduction that largely determines the nature of the end products.

The method of preparing these compounds by the reaction of an arsine with an arsenoxide is probably a general method for the preparation of these compounds. However the experimental difficulties of producing the arsine and condensing it with the arsenoxide before it is oxidized partially at least to the arseno stage make this method of little more than theoretical interest.

The question of the rearrangement of two symmetrical arseno compounds was investigated by us in the case of 4-4′-dihydroxyarsenobenzene and arsphenamine.

In the course of some of this work we produced 3-amino-4:4′-dihydroxyarsenobenzene. This represents arsphenamine minus one of its important anchoring groups according to Ehrlich. We were interested to see if this loss was reflected in its therapeutic efficiency.

EXPERIMENTAL.

The Preparation of Unsymmetrical Arseno Compounds by Reduction of Equimolecular Mixtures of the Arsinic Acids with Sodium Hydrosulphite.—Several attempts were made to prepare unsymmetrical compounds by this method. The experiments tried were selected so that the course of the reaction could be followed easily by solubility tests. Conditions analogous to those used for the production of arsphenamine were used. Supplementary experiments were also tried where the acids were reduced in the presence of sodium acetate and also where a preliminary reduction was carried out in the presence of strong acid with a trace of hydrogen iodide present, later making alkaline and reducing with sodium hydrosulphite.

4-Hydroxy-4-aminoarsenobenzene.—A number of attempts to prepare this by the reduction with sodium hydrosulphite of equimolecular mixtures of the two arsinic acids were tried. Mixtures of the three possible products were obtained in all cases usually with the symmetrical 4-4′-dihydroxyarsenobenzene predominating.

[1] *Loc. cit.*

[2] *J. Chem. Soc.*, 49, 1416, 1117, 1921.

4-Amino-arsenophenyl-4'-glycine.—Mixtures were also obtained in this case on reduction of equimolecular mixtures of phenylglycine-*p*-arsinic acid and arsanilic acid with sodium hydrosulphite under the conditions before given.

3-Amino-4:4'-dihydroxyarsenobenzene.—Christiansen[1] has described the production of this compound by the reduction of equimolecular mixtures of the two arsinic acids with sodium hydrosulphite using the conditions for the reduction used in the production of arsphenamine. For the determination of the purity of his product he relied on the solubilities and the arsenic determination. These, however, would not detect the presence of arsphenamine in this product as an impurity. We repeated the work of Christiansen and analyzed the product in the form of the hydrochloride for arsenic and nitrogen. These when expressed in terms of atomic ratios gave 2 arsenic to 1.08 nitrogen showing the admixture of appreciable amounts of arsphenamine in this product.

4-Hydroxyphenylarsenous Oxide.—The acid from which this was prepared was obtained by the method given by Jacobs and Heidelberger[2] by the fusion of phenol with arsenic acid and the isolation of the acid as the sodium salt. Fifty-seven grams of this sodium salt were reduced to the arsenoxide stage by the methods given in the patent.[3] This reduction must not be allowed to run for too long a period of time as sulphonation is liable to occur. From the 57 grams of the acid 21 grams of the dry arsenoxide[4] were obtained. As it was necessary to have the exact purity of this compound for subsequent work it was analyzed not only for arsenic but also by titration with 0.1 *N* iodine solution.

Subs., 0.2885; loss, 0.204 *in vacuo* at 100° over $CaCl_2$. Moisture, 7.06.
Subs., anhydrous, 0.2000, 0.2000; 21.48, 21.44 cc, 0.1 *N* $Na_2S_2O_3$ (Lehmann).
Subs., anhydrous, 0.2000, 0.2000; 21.55, 21.55 cc, 0.1 *N* iodine.
Calc. for $C_6H_5O_2As$: As, 40.76, 0.1 *N* iodine, 21.74.
Found: As, 40.27, 40.20, 0.1 *N* iodine, 21.58, 21.58.

3-Amino-4-hydroxyphenylarsenoxide.—This was prepared from 3-amino-4-hydroxyphenylarsinic acid by reduction[5] with sulphur dioxide. This was analyzed for arsenic and by titration with iodine to determine the purity. Products consisting of 40 to 60 per cent. of the arsenoxide mixed with salt were obtained.

3-Amino-4:4'-dihydroxyarsenobenzene.—The reduction of equimolecular mixtures of the two acids gave this product contaminated with appreciable quantities of arsphenamine. The reaction of 3-amino-4-hydroxyphenylarsine with 4-hydroxyphenylarsenious oxide can be used to prepare this compound but the experimental difficulties make this only of theoretical interest. The two symmetrical compounds put together in alkaline solution and held there for two hours at 55° to 60° C. did not rearrange to give this unsymmetrical derivative. We found that the reduction of equimolecular mixtures of 3-amino-4-hydroxyphenylarsenious oxide and 4-hydroxyphenylarsenious oxide gave the derivative desired quickly and in practically quantitative yields. One prerequisite for the success of this experiment

[1] *Loc. cit.*
[2] *J. Am. Chem. Soc.*, 41, 1446, 1919.
[3] D. R. P., 213,514.
[4] Care must be used in working with this as it is very irritating to the mucous membrane of the nose and throat.
[5] P. Ehrlich and A. Bertheim, *Ber.*, 45, 1, 756, 1912.

though was the exact quantitative determination of the purity of the oxides used.

For the production of 3-amino-4:4′-dihydroxyarsenobenzene in a state of purity we proceeded as follows: 16.400 grams (44.9% oxide) of the 3-amino-4-hydroxyphenylarsenious oxide and 7.400 grams (92.0% oxide) of the 4-hydroxyphenylarsenious oxide were dissolved in 60 cc. of methyl alcohol and 37.2 cc of *N* sodium hydroxide were added and the solution diluted with 600 cc of water in a reduction cell[1] and 60 grams of sodium hydrosulphite (90%) were added. An immediate thick yellow precipitate of the arseno compound resulted. The reaction was allowed to continue for 15 minutes at 20° C. At the end of this time it was filtered off, washed and dried in an atmosphere of carbon dioxide in the patent filter desiccator described by Heyl and Miller. The yield of the dry base was 13.1 grams. The hydrochloride was prepared from this by dissolving the base in 65 cc of absolute methyl alcohol containing 18.5 cc of 2 *N* methyl alcoholic hydrochloric acid, filtering in an atmosphere of nitrogen and precipitating by running it into one liter of dry chilled ether. The grayish colored hydrochloride was centrifuged off and washed with 400 cc of ether and dried *in vacuo* over phosphoric anhydride. The yield of the hydrochloride was 13.3 grams (93%). This formed an amorphous light gray powder containing 35.15% arsenic. This material was soluble in dilute sodium hydroxide and in dilute hydrochloric acid solution showing the absence of the symmetrical derivative, 4:4′-dihydroxyarsenobenzene. The material was ampouled up and sealed in the presence of carbon dioxide in the usual manner.

The product was analyzed for arsenic, nitrogen, and chlorine and these expressed in terms of atomic ratios showed the absence of any detectable amounts of the two possible symmetrical impurities.

Subs. 0.2000, 0.2000, 18.75 cc, 18.75 cc, 0.1 *N* $Na_2S_2O_3$ (Lehmann).
Subs. 0.3000, 0.3000, 14.18 cc, 14.31 cc, 0.05 *N* HCl (Kjeldahl).
Subs. 0.3000, 0.3000, AgCl, 0.1014, 0.1030.
Calc. for $C_{12}H_{12}O_2\ NAs_2Cl.2H_2O$: As, 35.42, N, 3.30, Cl, 8.38.
Found: As, 35.15, 35.15, N, 3.31, 3.34, Cl, 8.37, 8.49.

Toxicity and Trypanocidal Activity of 3-Amino-4:4′-dihydroxyarsenobenzene.—The toxicity of this was determined using the method for arsphenamine. Two per cent. solutions were employed containing sufficient *N* sodium hydroxide (3 mols.) to form the di-phenolate (calculated from the percentage of arsenic). The observational period was two days. The maximum tolerated dose was 140 mg./Kg.

Some observations were made to determine the minimum effective dose required to sterilize rats which previously had been infected with *Trypanasoma equiperdum*. The methods employed by Voegtlin[2] and Miller were used. The therapeutic ratio was determined on a sample having a minimum lethal dose of 160 mg./Kg. The experimental infection was fairly uniform and varied from 135,000 to 150,000 per cmm. of blood. In order to sterilize in 24 hours 6.3 mg./Kg. doses were necessary. If the observations as to sterility were made in 3 days the

[1] Heyl and Miller, JOUR. A. PH. A., 11, 6, 431, 1922.

[2] *Public Health Reports*, 37, 27, 1627, 1922. The strain of *Trypanasoma equiperdum* used in this work was kindly furnished by Dr. R. E. Dyer, Assistant Director. Hygienic Laboratory, United States Public Health Service.

average dose required was the same. For the 24 hour period the therapeutic ratio was 25 and for the 3 day period the same.

3-Amino-4:4′-dihydroxyarsenobenzene-N-methylenesulphinate.—We were interested in the determination of the maximum tolerated dose of this derivative. We used for this the same procedure used by us for the determination of the maximum tolerated dose[1] of neoarsphenamine. 2.5144 grams of the hydrochloride of 3-amino-4:4′-dihydroxyarsenobenzene (35% As) were dissolved in 15 cc of methyl alcohol containing 1.47 cc of 2 *N* methyl alcoholic hydrochloric acid. The condensation was made with 3.60 cc of 50% formaldehyde sulphoxylate solution (2 mols.). The reaction was run for 15 minutes at 21° C. and then 6.24 cc of 10% sodium carbonate solution were added. The solution after the removal of most of the alcohol in a vacuum was made up quantitatively to 110 cc. This solution represents a 4% solution of the drug containing 20% arsenic.

Sodium 3-amino-4:4′-dihydroxyarsenobenzene-*N*-methylenesulphinate is a very unstable chemical, solutions of it decomposing very quickly. It had a maximum tolerated dose of 250 mg./Kg. Lethal doses produced immediate symptoms. The animals resisted the latter part of the injection and showed dyspnea followed quickly by convulsions and final collapse.

The free neo-acid from this solution was precipitated out, washed and the arsenic, total sulphur, and amino sulphur determined using the same methods[2] we used for neoarsphenamine. The loss in arsenic in the precipitated neo-acid was from 2 to 3 per cent., showing the absence of any appreciable amount of the unreacted upon arseno compound in this product.

The percentages of arsenic and sulphur expressed in terms of atomic ratios were 2 to 0.68 for the amino sulphur and 2 to 0.75 for the total sulphur. These analytical results indicate that the *N*-methylene sulphinic acid derivative first formed probably reacted with some of the unchanged arseno compound with the formation of a salt-like compound of the type $RNHCH_2OSONH_3R$ and the product was a mixture of this with the 3-amino-4:4′-dihydroxyarsenobenzene-*N*-methylenesulphinate. Binz and Marx[3] report this same type of reaction when aniline and orthotoluidin react with formaldehyde sulfoxylate.

This condensation was run at a higher temperature (30° C.) and for a longer time (30 minutes) but the arsenic to sulphur ratios showed the production of the same type of compound.

3-Amino-4:4′-dihydroxyarsenobenzene-N-methylenesulphonate.—It was thought that this derivative might have more satisfactory properties than the corresponding *N*-methylenesulphinate described above. The same technique used in the preparation of neoarsphenamine was used in the production of this compound. To 4 Gm. of 3-amino-4:4′-dihydroxyarsenobenzene hydrochloride (35.15% As) dissolved in 6 cc of methyl alcohol and 56 cc of water were added 0.86 cc (1 mol.) of a $33^1/_3$ per cent. solution of formalin.[4] At the expiration of one minute[5] 3.25 cc of a 30% sodium bisulphite solution (1 mol.) were then added. A thick copious yellow

[1] M. C. Hart and W. B. Payne, *J. Am. Chem. Soc.*, 44, 5, 1150, 1922.

[2] Hart and Payne, *Loc. cit.*

[3] *Ber.*, 43, 2344, 1910.

[4] The strength of the formalin and bisulphite solutions were determined exactly by analyses.

[5] Longer times or an excess of formalin result in the formation of a jelly.

precipitate formed immediately and then slowly went into solution as the reaction proceeded. At the end of 10 minutes another mole of the bisulphite was added. The solution after 20 minutes was filtered in an atmosphere of nitrogen and precipitated by running into 400 cc of absolute alcohol. The cream colored precipitate was centrifuged off and washed with 300 cc of alcohol and then dried to constant weight over P_2O_5. A yield of 4.04 grams were obtained, containing 28.63% arsenic.

The substance was analyzed in the following manner: 2 grams of the sodium salt of the 3-amino-4:4′-dihydroxyarsenobenzene-*N*-methylenesulphonate were dissolved in 10 cc of water and precipitated with 25 cc of glacial acetic acid. The yellow precipitated acid was centrifuged off and washed 4 times with 30 cc of 85% acetic acid. The acid was finally made up quantitatively to 50 cc as the sodium salt and aliquots of this were used for the arsenic, total sulphur, and amino sulphur determinations.

The results of these analyses expressed in terms of atomic ratios showed the presence of 2 arsenic to 0.60 sulphur for the amino value and 2 to 0.65 for the total sulphur value. These results indicate that this reaction is of the same type as the methylene sulphinate discussed above.

Toxicity and Trypanocidal Activity of Sodium 3-Amino-4:4′-dihydroxy-arsenobenzene-N-methylenesulphonate.—The minimum lethal dose in 4% solution (29% As) by the official method for neoarsphenamine was 150 mg./Kg. On rats carrying an infection of 200,000 to 250,000 of *Trypanasoma equiperdum* per cmm. of blood the dose required to sterilize in 24 hours was 13 mg./Kg. and for 3 days was 7.8 mg./Kg. The therapeutic ratios therefore were 12 and 20, respectively.

Solutions of this compound could also be injected subcutaneously. By this method the minimum lethal dose was 250 mg./Kg. Subcutaneously it was also active trypanocidally. A dose of 19 mg./Kg. was required to sterilize rats for the 24 hour period which had an infection of 200,000 to 250,000 per cmm. of the trypanasomes. For the 3 day period 19 mg. were also required. The therapeutic ratio by this method is 13.

Solutions of this compound were also quite stable when exposed to the air. A solution which killed 4 out of 5 rats at 150 mg./Kg. when allowed to stand 24 hours in an open cylinder killed 2 out of 5 at the same dosage.

SUMMARY.

1. The following unsymmetrical arseno compounds have been prepared and studied with the following results:

(*a*) 3-Amino-4:4′-dihydroxyarsenobenzene for which the maximum tolerated dose was found to be 140 mg./Kg. with a therapeutic ratio of 25.

(*b*) 3-Amino-4:4′-dihydroxyarsenobenzene-*N*-methylenesulphinate for which the maximum tolerated dose at 20% arsenic was 250 mg./Kg.

(*c*) 3-Amino-4:4′-dihydroxyarsenobenzene-*N*-methylenesulphonate for which the minimum lethal dose intravenously was 150 mg./Kg. and subcutaneously 250 mg./Kg. The therapeutic ratios by these two methods were 12 to 20 and 13, respectively.

This compound is also stable and does not become more toxic on standing exposed to the air for 24 hours.

2. Reduction of molecular mixtures of the different arsenic acids with sodium hydrosulphite is not a general method for the production of unsymmetrical derivatives.

3. The loss of one of the essential anchoring groups, according to Ehrlich, from arsphenamine does not impair its therapeutic efficiency as far as these laboratory tests show.

In conclusion we wish to thank Dr. Frederick W. Heyl at whose suggestion this work was carried out.

KALAMAZOO, MICH.

ALOIN.

BY H. ENGELHARDT AND H. H. CROSBIE.

Aloin is defined in the United States Pharmacopœia as a pentoside or a mixture of pentosides, *i. e.*, compounds which resemble the glucosides and differ from them only in that one of the components is not a carbohydrate proper, but a five-atomic alcohol. Until about 20 years ago aloin was classed among the bitter principles, until Léger found that on prolonged hydrolysis with alcoholic hydrochloric acid it is split up into 1.8 dioxi-3 methylenoxianthraquinone and *d*-arabinose.

While introducing refinements in the process of manufacture, with the idea of greater purity, some difficulty was encountered with the solubility of aloin in water, which the U. S. P. states is 1 : 120. It was considered possible that in the manufacturing process of aloin under certain physical conditions (concentration, temperature and rate of crystallization) a product was obtained, which contained a larger amount of other less soluble pentosides. It was found that when shaking aloin with water in the proportion of 1 : 120, an apparently large amount of silky needles remained undissolved which made the solubility of the aloin not respond to the official requirement, *i. e.*, that not more than 1.5 per cent. of the aloin should be insoluble in the prescribed amount of water. The present U. S. P. Revision Committee proposed that the amount of water-insoluble matter be reduced to one per cent. and it was, therefore, interesting to find out whether or not aloin made by different reputable manufacturers would come up to this requirement. It was found that only one of these aloins out of four contained less than one per cent. of water-insoluble matter and this specimen had a pronounced odor of aloes which suggested that the mother-liquid had only insufficiently been removed. It was also found that a specially pure sample, which showed insufficient solubility, could be made to conform to U. S. P. requirements by the addition of 5% of powdered aloes, apparently a serious reflection on the test. And experiments showed that the solubility of aloin can be somewhat increased by not completely eliminating the mother liquid, but we believe that by doing so an aloin is obtained which is not completely devoid of the griping principles of the drug. To be frank, the insufficient solubility of the aloin was not due to the presence of other compounds (pentosides?) but to the temperature at which the solubility test had been carried out, because an aloin which when shaken with water in a

proportion 1 : 120 at ordinary laboratory temperature, gave 2 per cent. insoluble matter, left, when shaken at exactly 25° C. for two hours, only 0.7 per cent. of insoluble matter. When the shaking was done at 16° C., as much as 7.0 per cent. of the aloin remained undissolved. The solubility of aloin is therefore so dependent on the temperature that special mention should be made of the necessity of maintaining standard temperature.

It was further found that crystals over 100μ in length have a solubility less than that shown by crystals of average length of 10μ. Yet it is necessary to have a certain per cent. of this larger size in order to be able to eliminate last traces of mother liquor.

Confirmatory experiments were tried to test the theory that aloin was not a mixture, and these experiments may be of interest.

Having previously found that aloin when treated with an insufficient amount of acetone leaves a residue of a decidedly grey color, it had been assumed that separation could thus be effected by means of this solvent. On going into the matter more thoroughly it was found that when aloin was divided into 3 portions (by means of shaking with successive insufficient quantities of acetone and crystallizing these fractions) all three fractions had the same solubilities and melting points when *repurified by crystallization from water*. There is a breaking down of the aloin going on, the cleavage product being of a purple color which with the yellow of the aloin gave the gray color mentioned.

Fractional crystallization of aloin from water gave the same results.

The details of the experiments were as follows: An aloin which contained 6.5 per cent. of water of crystallization, was soluble at *ordinary* laboratory temperature to an extent of 97.6% and melted at 129°, was chosen for this purpose, 3 lbs. of this aloin was shaken for two hours with 15 pints of acetone. The mixture was then filtered under reduced pressure when a *greyish yellow* substance remained. The filtrate was concentrated in vacuo and the crystals which separated were recrystallized from water. They were of a beautiful golden yellow color, contained 7.65% of water of crystallization and melted at 134°. The greyish yellow substance, not dissolved in the first portion of acetone, was then shaken for two hours with 20 pints of acetone and the mixture was filtered again. A greyish purple substance remained undissolved. The filtrate was treated as above, *i.e.*, evaporated in vacuo and an aloin, also golden yellow in color, which contained 7.9 per cent. of water of crystallization and which melted at 138° was obtained.

The substance undissolved in acetone was shaken with 40 pints of the solvent, when practically all went into solution leaving only a small dark purple residue, which was not further examined. This third filtrate, which appeared more contaminated with cleavage products than the former filtrates, was treated differently. When concentrated and allowed to cool the cleavage products separated as an amorphous solid, which was quickly removed by filtration, before crystallization of the aloin had started. This amorphous solid was readily soluble in water, yielding a deep purple solution.

The aloin which crystallized from the filtrate was yellow and on recrystallizing from water had a brilliant yellow color, contained 6.5 per cent. of water of crystallization and melted at 138°.

These three fractions of aloin were almost completely soluble in water when

tested by the official method at ordinary temperature. This evidence, *i. e.*, almost identical melting points, solubilities and their water of crystallization confirms the theory that aloin is *one* chemical substance (apart from small amounts of unavoidable cleavage products). In regard to the melting points it may be said that these were not entirely sharp. The different specimens of aloin sintered at about 110°, but then melted rather sharply at the above cited temperatures. That the original aloin was not quite as pure as the three fractions is shown by the melting point, 129°, but one has to consider that even infinitesimal quantities of cleavage products, which are unavoidable to be produced in the manufacturing of products of this kind, are liable to depress the melting point considerably.

A further experiment was very interesting. One pound of aloin was shaken for two hours with 100 lbs. of water and the temperature kept low enough to give an undissolved residue, representing 10 per cent. of the original aloin. This residue was dried and under the microscope showed needle crystals, the larger being 110μ long. On recrystallizing these needles from water under conditions favorable for the development of small crystals, needle crystals not exceeding 12μ in length were obtained. The latter showed a much better solubility when submitted to the U. S. P. test than the former, leading to the conclusion that the variations in solubilities found have a physical and not a chemical cause. And that the solubility of aloin is entirely dependent on the temperature at which the dissolving is carried out, as already mentioned, is shown by the following experiments. The original aloin taken in these experiments was shaken with water in the proportion 1 : 120 at 15°, when 7 per cent. remained undissolved. When shaken at 20°, 2.3 per cent., at 22.5°, 1.0 per cent. and at the official temperature 25°, 0.2 per cent. remained undissolved.

On various occasions we have been asked if there were a reliable method for estimating aloin in aloes. Our answer always has been "no." Quite a number of methods have been recommended but by none can the amount of aloin even approximately be determined.

Tschirch suggested, in order to evaluate aloes, to extract aloes with a mixture of methyl alcohol and chloroform, by which only the active substances are dissolved, while the inactive resins remain undissolved. This method cannot be considered as reliable because it cannot be accepted that the amount of crystalline aloin is always the same in the active resins.

Schäfer's method which depends on the extracting of aloes with water, rendering the solution alkaline with ammonia and then precipitating the aloin by means of calcium chloride, etc., gives wholly unreliable results, because they do not agree with the amount of crystalline aloin afterwards obtained. The resulting product appears to be something other than pure aloin.

Having found that aloin gives a highly fluorescent solution with borax solution, Schotenten thought of utilizing this property of aloin for estimating it in aloes. The drug was extracted with water, to the aqueous solution a strong borax solution was added and the liquid was then diluted with water until a just perceptible fluorescence was exhibited, it having previously been found that such a fluorescence is produced by a solution of pure aloin in borax solution in a dilution of 1 : 250,000. From the amount of aloes taken and the dilution, he claimed that the percentage of aloin could easily be calculated. This claim is not justified at all, because the

amorphous substances, which are nearly related to crystalline aloin, give this fluorescence with borax solution also.

The following experiments, which were made quite a number of years ago, may be of interest.

A large quantity of aloes was worked up in the process of making aloin, and the material was tested by this method both before and after the extraction of the crystals.

The test gave a higher figure for aloin content *after* the aloin had been removed than before, and neither figure had any relation to the actual amount found, which was normal.

This again shows that these resins are nearly related to crystalline aloin, a claim which is also corroborated by the fact, that when treated with Caro's acid both the crystalline aloin and these resinous substances yield tri- and tetra-oxi-methylanthraquinones.

The precipitation of aloin as tri-brom-aloin by means of bromine water gives unreliable results also, because the amorphous oximethylanthraquinones are precipitated together with the aloin.

The only way we know of to determine the amount of aloin in aloes is to work up about 10 pounds of aloes; but such a process is not very feasible, because while at times under certain conditions the aloin may crystallize out within a few days, under other conditions, especially when a larger amount of amorphous substances than usual is present, the complete crystallization may take weeks.

It is to be regretted that up to the present time no reliable assay process is at our disposal for such a valuable and widely used drug as aloes.

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A SOURCE OF ERROR IN EMPLOYING FUCHSIN-SULPHUROUS ACID SOLUTION AS A TEST FOR FORMALDEHYDE IN ETHYL ALCOHOL.*

BY JOSEPH L. MAYER.

The U. S. P. test for methyl in ethyl alcohol depends upon the oxidation of the methanol by means of potassium permanganate to formaldehyde and the detection of the latter by fuchsin-sulphurous acid in the presence of sulphuric acid.

The fuchsin-sulphurous acid solution is known as Schiff's Reagent and is employed for the detection of aldehydes in general, but taking advantage of the fact that sufficient sulphuric acid prevents development of color by acetaldehyde which is the product formed when ethyl alcohol is oxidized, Denigès suggested that the fuchsin-sulphurous acid solution be added in the presence of sulphuric acid, and in this form the test is official in the U. S. P.

In the final steps of the test there are added to the oxidized material one cc of strong sulphuric acid and five cc of fuchsin-sulphurous acid solution and if a distinct blue or violet color is produced formaldehyde is indicated; as this results from oxidizing methyl alcohol the latter is reported.

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* Read before New York State Pharmaceutical Association, Stamford meeting, 1923.

In an effort to employ this test for the detection of formaldehyde in ethyl alcohol I conducted the following experiments:

(*A*) To 5 cc of ethyl alcohol, which had been redistilled from sulphuric acid and then over potassium hydroxide and containing 94.78% of absolute alcohol, there were added 1 cc concentrated sulphuric acid and 5 cc fuchsin-sulphurous acid solution. The result was an immediate purple color, indicating the presence of formaldehyde.

(*B*) Repeating the test as above but increasing the quantity of sulphuric acid to two cc the result was a garnet-colored solution.

(*C*) In this test the quantity of sulphuric acid was increased to three cc and the result was the same as in *B*.

(*D*) The quantity of sulphuric acid in this test was increased to four cc and the result was the same as with *B*.

(*E*) Increasing the quantity of the sulphuric acid in this test to five cc produced the same result as in *B*.

(*F*) Five cc of the above 94.78% ethyl alcohol without previous distillation from acid or alkali, when treated as under *A*, yielded results identical with those under *A*.

Another series of tests was made as follows:

(*G*) The above 94.78% alcohol was reduced with water to 10 per cent. by volume and 5 cc of the diluted sample was tested by adding one cc of concentrated sulphuric acid and five cc fuchsin-sulphurous acid solution. The result was a colorless solution proving the absence of formaldehyde.

(*H*) Five cc of a 5% dilution of the above 94.78% alcohol when tested as under *G* yielded a colorless solution, thus indicating the absence of formaldehyde.

(*I*) To 100 cc of the above 94.78% alcohol there was added 0.02 cc of 37% solution of formaldehyde. This solution was then diluted with water to contain 5 per cent. by volume of alcohol. Five cc of this solution tested as under *G* immediately produced a purple color showing the presence of formaldehyde.

The fuchsin-sulphurous acid solution of the U. S. P. not being very satisfactory I have for some time employed the following modification of Elvove:[1]

Two-tenth grams of fuchsin are dissolved in 120 cc of hot water; after cooling to room temperature there are added 2 grams anhydrous sodium sulphite, dissolved in 20 cc of water, followed by 2 cc concentrated HCl and then the whole diluted to 200 cc. Allow to stand one hour before using. Stopper in amber-colored bottles. The solution will keep several weeks.

In connection with this work I made comparative examinations of the commonly employed tests for the detection of formaldehyde and, as a result, conclude that in addition to the fuchsin-sulphurous acid among the most sensitive and easily applied tests are the following:

Dodsworth and Lyons' modification of Hehner's test suggested by A. B. Lyons in his paper "Detection of Wood Spirit in Alcoholic Beverages,"[2] which is employed is as follows:

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[1] *J. Ind. Eng. Chem.*, 9, 295, 1917.

[2] Jour. A. Ph. A., 10, 13, 1922.

To 1 cc of alcohol add 10 drops of albumen solution from a pipette which delivers 30 drops to the cc. Shake thoroughly and then underlay with 1 cc of ferrated sulphuric acid. In the presence of formaldehyde a beautiful purple ring will form.

In determining the sensitiveness of this test I added 0.01 cc of the 37% formaldehyde solution to 100 cc of the above 94.78% alcohol. One cc of this solution was then added to 99 cc of the 94.78% alcohol, and to one cc of this solution (which contained 0.000001 cc of the 37% formaldehyde solution per cc) there were added 10 drops of albumin solution and, after shaking thoroughly, 1 cc of ferrated sulphuric acid so as to form a distinct layer. Upon slightly twirling the tube to produce a very gentle mixing a beautiful purple color made its appearance.

Morphine-sulphuric acid solution produces with formaldehyde a beautiful purple color. The test was made by taking 1 cc of the above very dilute solution of formaldehyde (containing 0.000001 cc of 37% formaldehyde solution per cc) adding five drops of morphine solution and underlaying with sulphuric acid. After gently rotating the tube to produce a slight admixture a beautiful purple color appeared.

Alcohol free from formaldehyde tested in various dilutions did not show the presence of formaldehyde when these tests were applied.

It should be remembered that both of these tests are more sensitive in the presence of traces of formaldehyde than when larger amounts are present.

The following reagents were employed in making the tests:

Ferrated Sulphuric Acid.—Dissolve 0.030 Gm. of ferric-ammonium alum in 1 cc distilled water and add to 100 cc of sulphuric acid, U. S. P.

Solution of Albumen.—0.100 Gm. dried egg albumen, dissolved in 10 cc of distilled water.

Solution of Morphine.—Dissolve 0.50 Gm. of morphine in enough diluted sulphuric acid to aid solution and add sufficient distilled water to make 100 cc.

SUMMARY.

1. Formaldehyde-free undiluted ethyl alcohol when tested for formaldehyde by means of fuchsin-sulphurous acid solution in the presence of sulphuric acid will give a strong positive reaction.

2. Formaldehyde-free ethyl alcohol diluted to 5% or 10% with water will not give a positive reaction for formaldehyde when tested with fuchsin-sulphurous acid in the presence of sulphuric acid.

The test will detect 0.00005 cc of the 37% formaldehyde in the amount of sample (5 cc) taken for analysis.

3. The ferrated-sulphuric-acid-albumen and the morphine-sulphuric acid reagents are both very sensitive, detecting 0.000001 cc of 37% formaldehyde solution in the 1 cc of sample taken for analysis.

4. All three tests are easily made and do not indicate the presence of formaldehyde in ethyl alcohol which is free from it.

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NOTES ON THE PHARMACEUTICAL METHOD OF CLARIFICATION.

BY SIMON MENDELSOHN.

The general pharmaceutical procedure of clarification by the intervention of various absorptive media, involves a considerable diminution of the volume of the resultant filtrate. The extent of such deficiency is a specific factor of any particular absorptive material and is proportional to the quantity employed.

The retentive function exerted by an absorptive, with regards to particles of mechanical impurities (macroscopic) or dispersed colloidal matters in suspension, is not ordinarily subject to interference by the quantity of suspended particles in unit volume of the original liquid, when the process is conducted upon a limited scale.

Retention of suspended matter obviously continues, until the capillary activity of the porous media is retarded. The inverse ratio existing between the quantity of absorptive employed and the volume of filtrate obtained, can be reduced to "specific" proportions, based upon the percentage of solid required by a definite volume of a liquid subject to clarification.

Numerous experiments were conducted for the purpose of securing data, regarding the greatest possible volume of liquid susceptible to clarification, by a minimum of absorptive media. The data thus afforded and herein presented, can be utilized to material and economical advantage.

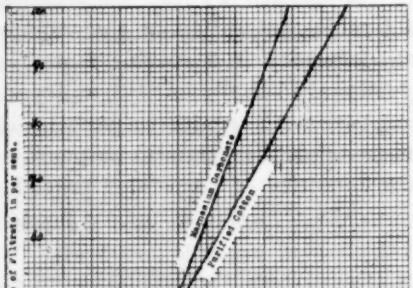
Absorptive.	Loss in volume. Absorption in grams. 5.	10.	Deficiency in volume. of filtrate in per cent. 5.	10.	200.0 cc H_2O employed for each test. Draining period five (5) minutes. Deductions allowed for accessory absorption by filter paper.
Magnesium Carbonate Refer to (1)	25.0	20.0	12.5	10.0	Insoluble in H_2O, but nevertheless it imparts alkaline reaction to liquid.
Fuller's Earth	10.0	15.0	5.0	7.5	Aluminum Silicate—$H_2Al_2Si_2O_8$ + H_2O may contain Fe as an impurity.
Willow Charcoal	7.5	10.0	3.75	5.0	Tendency to induce oxidation of organic substances in solution, decolorizes and simultaneously absorbs odors.
Prepared Chalk	5.0	15.0	2.5	7.5	Practically insoluble in H_2O, solubility increased by presence of NH_3 salts and particularly by CO_2.
Purified Talcum	5.0	7.5	2.5	3.75	Insoluble in H_2O. May contain Fe as an impurity.
Purified Cotton	25.0	60.0	12.5	30.0	Excessive absorption.
Filter Paper	Weight = 5.15 grams				10.0 cc loss in volume of filtrate.

(1) The figure in the 4th column was due to experimental error. The correct value is shown on graph.

CONCLUSIONS.

1: Consideration of the minimum loss in volume of a filtrate, sustained through the use of purified talc, and its insoluble siliceous character, renders this material

comparatively superior to all of the other absorptives examined. Talc in proportion of less than (1) per cent. of the volume of the liquid subject to clarification, has been found to yield excellent results.



2. The loss in volume of the filtrate is a trifle higher when calcium carbonate is employed instead of talc. The filtrate is entirely satisfactory. The practical utility of this absorptive is limited only to liquids of either an alkaline or neutral reaction. Owing to certain alkalies facilitating the solubility of calcium carbonate, its field is virtually restricted to neutral media.

3. Charcoal is applicable within a limited extent, as a clarifying agent, due to its principle property of decolorization and deodorization, it cannot be employed with impunity, in the treatment of aromatic commodities in the course of manufacture, *i. e.:* perfumes, toilet waters, or elegantly colored liquids in general.

4. Magnesium Carbonate produces a brilliant filtrate. Use restricted to neutral of alkaline liquids. Volume loss of filtrate extremely high.

The relative experimental losses of volume, incident to clarification were determined upon water, proceeding a uniform drainage period of five (5) minutes for each specimen of porous material subject to test. The mathematical functions of factorial variations applicable to the process when a liquid of definite concentration is concerned, become directly proportional to the specific density of the liquid.

A gravity factor below unity implies a negative equation while a liquid of density exceeding unity necessarily introduces positive increments of variation.

The accompanying graph illustrates the tabulated results combined with experimentally interpolated values to show the continuous superiority of the various absorptive media.

MANUFACTURE OF RENNET CASEIN.

In the Kaira district of Bombay Presidency lactic casein is made in large amounts from "separated" milk, and is exported to Europe. Rennet casein is also in demand in Europe for the preparation of substitutes for celluloid, such as "galalith" and "erinoid." Investigations are now being made into the production of rennet casein from "separated" milk; vegetable rennets are being used, and the following have been tried: (1) Fruit of *Withania coagulans;* (2) juice of *Streblus asper;* (3) *Crotolaria burhia;* (4) *Leucas cephalotes.* Of these, the pulp of the immature fruit of *Withania coagulans* serves better than the others for clotting milk; the mature fruit of the same plant has no activity. The juice of *Streblus asper* is very active when fresh, but it loses its activity in course of time. The others were found to be inactive.—*Journ. Indian Ind. and Labour,* February, 1923, 95; through *Journal and Pharmacist.*

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SODIUM CHLORIDE.*

BY H. L. HARRIS.

Sodium chloride has been used for ages for preserving meat, fish and as a condiment for foods. Many persons believe that the consumption of sodium chloride is essential to maintain health. The medical fraternity, however, is continually finding the deleterious effect of sodium chloride on the human system.

I have been accumulating matter on the value of a salt free diet for a number of years.

The death rate from nephritis and Bright's disease, heart disease and kidney diseases has increased enormously during the last fifteen or twenty years; and it is a noticeable fact that this increase has been much larger in the United States than in England. The reason for this may, no doubt, be that England objects to heavily salted foods; thus, her hams and bacon are preserved with borax and her butter with one-half of one per cent. of boric acid instead of salt.

The following quotations will show the value of a salt-free diet.

Moras (1), in the "Avoid the Over-use of Table Salt," says:

"Call this my no-salt theory, if you like, but with me it is a fact or conviction, born of experience and confirmed by practice and results.

"Salt ages people. Salt favors deposits in blood-vessels and joints. Salt robs the hearts of marrow of the tissue-cells. Salt is an enemy to good digestion and assimilation. Salt is the most prolific cause of stomach, bowel, kidney, nerve, vital and sexual impairments. It aggravates catarrh and rheumatism. In any but the 'normal' amount found in foods, table salt is slightly or decidedly injurious in proportion to the excess taken, though the system becomes accustomed to it as it does to tea, coffee, tobacco, vinegar, and sweets.

"The average eater consumes at least ten to twenty times more than the system requires in each twenty-four hours. This necessarily keeps the tissues and fluids over-salt, as butter is. Salt "draws" water and creates thirst, but the water that it draws from your blood and flesh takes some essential living proteid (albuminoid) constituents along; whereas the water which you drink to substitute that which salt abstracts is 'dead water.'

"Another reason still why salt is bad is that its habit so perverts your taste that you swallow soup and meats and vegetables only because they are salty and, therefore, you hurriedly swallow the mouthful or morsel in your rush for the next, with never a care of your bolting foods and 'gulping soups.' Use practically no table salt, except a very little in the cooking, and see how instinctively your tongue will search each little bite for its own distinctive taste, which it will rediscover and relish after a week's attention to proper eating as later explained."

Salted butter is vile stuff and should never be used for eating or cooking.

Dr. Piersol (2) says:

"In this way the phosphates in the blood are rendered available for neutralizing acids in the plasma, even when the normal carbonates of the plasma are exhausted. A similar reaction goes on with many other cells of the body, so that actually the blood plasma can avail itself, when the necessity arises, of the alkalies contained in all the body cells.

"The method by which proteins act as a buffer substance is not clearly understood. They probably play a subsidiary rôle. They are amphoteric and are capable of combining with either acids or alkalies.

"The ability of the kidneys to eliminate acid urine from alkaline blood is another important factor in maintaining the acid base equilibrium. Were it not for this, neutral salts would be eliminated through the kidney, and to quote Howland, 'every molecule of acid would rob the body of a molecule of bicarbonate.' Instead, when an acid is introduced into the body and is neutral-

* Scientific Section, A. Ph. A., Cleveland meeting, 1922.

ized, sodium chloride and acid sodium phosphate are eliminated by the kidneys as is shown by the following equation:

$$Na_2HPO_4 + HCl = NaCl + NaH_2PO_4.$$

"Acid sodium phosphate is removed, but some base is saved. Another reaction which may occur is as follows:

$$Na_2HPO_4 + H_2O + CO_2 = NaH_2PO + NaCHO_3.$$

"Under these conditions the bicarbonate reserve of the blood is actually increased. Although some alkali is lost in the urine, enough is retained by reason of this ability of the kidneys to conserve the bases, so that the difference under normal circumstances can be made up by the food. It has been shown that the alkalies saved by this function of the kidneys, *i. e.*, to free the body of acid and acid phosphate while alkalies are held back, amounts to from two hundred to eight hundred cc of one tenth normal sodium hydroxide a day."

Dr. H. O. Beeson (3) says:

"Prescott, in his history of Mexico, relates instances of the tribe of Tlascalans, with whom he had made an alliance, and by their aid was enabled to establish himself in that country, in which he states that they had been imprisoned on a high mountain plateau for fifty years by the allied tribes about them, during which time they had not been allowed to visit the low lands to procure salt, and that after fifty years of salt deprivation, he found them strong, courageous and enduring."

"Human blood contains four-tenths to five-tenths of one per cent. The same is true of the tissue serum. The cells contain no sodium chloride. They will not take it. They will give up some of their water to dilute a pabulum of greater saline density than their own. This shrinkage becomes fatal when the osmotic density exceeds nine-tenths of one per cent.

"The amount of salt that can be used without producing harm cannot be determined by the sense of taste alone. It must conform to the physiological needs and must not exceed the limits of cell integrity. A cell cannot exist in a solution of greater osmotic density than nine parts per thousand, for beyond that it will give up some of its water and shrink, and thereby becomes incapable of performing its functions."

What is our consumption of salt per capita per diem? I have been unable to find in medical literature any statement of the average amount used by the American people. Charles Archard states that the average consumption of the French people is 20 grams. That makes 300 grains. Our War Office gives the daily ration to the United States soldier as 16–25 of an ounce. If I am not mistaken, that makes 307 grains. The soldier's ration of food is 35 ounces. This is a proportion of 1 to 55 or 18 to 1000. We may take it as the best criterion of the amount used by the American people from which the American soldier is derived. 300 grains weighed out fills a tablespoon heaped up. That is what we use daily. This is the result of being guided by the taste alone, giving no consideration to the physiological needs of the body or of the evil effects of the increased osmotic tension upon digestion and nutrition.

All physiologists agree that 95 per cent. of the salt ingested is eliminated unchanged within twenty-four hours. Then, of the 300 grains eaten daily by the average American, 285 grains are cast out of the body as foreign material as rapidly as the emunctories can accomplish the work. And who is there to say that this can be carried on for years without harm?

The use of an excessive amount of salt with food causes:

"1. Inhibition of the production of digestive secretions.

"2. Consequent retardation of digestion.

"3. Favors the growth of saprophites by reason of delay in digestion, with consequent slight but persistent ptomaine toxemia.

"4. Retards absorption, hence interferes with the prompt removal of the products of digestion. "Saline solutions are absorbed in a ratio inverse to their density."

"5. Being eliminated in large part by the mucous membranes, the exosmosis produced causes exhaustion and final infection, and the foundation of chronic catarrh is laid.

"6. The daily extra work put upon the emunctories in eliminating the surplus and the evil effects of the hypertonic osmotic tension on the cells results in general glandular insufficiencies and final degeneration.

"7. The hypertonic osmotic tension of the blood serum exhausts the red cells of their water and makes them poorer oxygen carriers, thereby inhibiting metabolic processes and the oxidation and elimination of bodily waste.

"8. The bodily distresses caused by these disturbances of metabolism and elimination, and the demand for diluent due to the presence of an undue amount of this highly osmotic agent, together with the mucous membrane excitation caused by the excess of sodium chloride in the mucus bathing them, are the foundation of the drink evil and the sexual perversions. If not the chief cause they are certainly important ones.

"9. A sufficient amount of salt to be used is 15 to 30 grains to meet all the demands of nutrition and any in excess of this is not only useless but distinctly detrimental."

Dr. Leva (4) says:

"We are in the habit of taking daily with our food 10 to 15 Gm. of common salt, and this quantity is often considerably exceeded. There is, however, in reality no physiological necessity for this, for on the one hand we know that carnivorous animals, in order to thrive, require no addition of salt whatever to their foods, and meat, we know, does not contain more than 0.1–0.2 NaCl, and on the other hand we are acquainted with nations living in a state of Nature who live only on animal food (flesh and milk) and either do not know common salt at all or else together disdain it. But with civilized man the amount of salt supplied depends more on training and habit than on any real need for it, and, as a large number of observations on health and diseased individuals have taught us, may be greatly reduced without harm."

Deutsche Medizinische Wochenschrift (5) says:

"Salt is not the only factor in hydrops, but is such an important one that removal of this link in the chain is one of the main points in treatment of nephritis with a tendency to dropsy. The food is best prepared entirely without salt, and the modicum of salt permitted is given the patient to season the food as he likes. The amount should not be over 2.5 Gm. a day in severe cases of parenchymatous nephritis with much dropsy or when it is feared that dropsy is impending."

Gasteira (6) discusses the causes, forms and consequences of renal congestion and emphasizes the necessity for measures to restore the balance in the cardiovascular system with restriction to a milk diet, or better still, to a salt-free diet, supplemented by diuretics according to individual indications.

Barlow (7) in an editorial on "Poisoning from Common Salt" (*Journal A. M. A.*, Oct. 5, 1912, p. 1297), speaks of the condition as a rare one.

"I wish to give my experience with several cases of fatal salt poisoning in China.

"Throughout Chekiang Province, and probably in other provinces of China, the drinking of saturated solution of salt is a common mode of committing suicide, and there is none more difficult to treat. In only one case did I succeed in securing recovery. Salt is taken for suicidal purposes sometimes in a common saturated solution made with water as the solvent, and some times in the brine from salted kraut."

Pitres (8) remarks:

"The consensus of opinion is now that the seizures of epilepsy are brought on by some perversion in the metabolism of proteins, and consequently the diet should be regulated with this in view, keeping the unstable gastro-intestinal tract under constant supervision. De Fleury even

forbids the use of milk and keeps his patients on a strictly vegetable diet, with as little salt as possible."

Pennsylvania Farmer (9):

"Salt is just as necessary to poultry as to other animals. The only safe kind to use for poultry is very fine salt such as table or dairy salt. Salt should be supplied to the poultry in their mash, using a tablespoonful to every large bucket of meal. Fowls cannot be trusted with a free supply of salt such as rock salt grit since they will indulge to excess, resulting in death by salt poisoning."

"The dietetic treatment (10) is of the greatest importance in cases of hyperchlorhydria. In the first place, extremes of temperature should be avoided in both food and drink. Food should be eaten slowly and thoroughly masticated, not only to facilitate salivary digestion, but to avoid irritating the stomach mechanically. All substances that are likely to irritate the gastric mucosa must be eliminated from the dietary. All kinds of acids, including the organic, such as citric, tartaric, and acetic must be forbidden; also spices of all kinds—pepper, mustard, horse radish, etc."

"The salt-free diet should be instituted in every case of persistent hyperchlorhydria."

Dr. J. N. Hurty (11) says:

"Salt, too, in the large quantities in which we generally use it, lays an unusual burden upon the kidneys and injures them. All embalmed meats, ham, bacon, corned beef, dried beef, and smoked sausages, etc., very slowly but surely damage the kidneys, liver and other vital organs. All this is not new, for it is told over and over by the authorities.....

"It is my belief that more harm, if any, would result from the rich ice cream and fruit cake, as they almost always are eaten when the body does not need food and purely to indulge the sense of taste, than from the benzoate of soda as a preservative of foods; and I am also strongly opposed to embalmed meats with their kidney-destroying saltpeter, their creosote and excessive amount of salt. As for spices—they are an abomination as articles of diet. They are constipating, stimulating and irritating.

"In what I have said there is nothing new. The same has been taught by physiology and dietetics for years."

It is evident from the above that sodium chloride is not the innocent condiment it is supposed to be, and that it is not an essential substance for the welfare of the human system.

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NEW DRUGS INTRODUCED DURING THE LAST FIFTY YEARS.*

BY E. M. HOLMES.[1]

Mr. Clyde L. Eddy, Secretary of the Section on Historical Pharmacy of the American Pharmaceutical Association, has asked me to contribute any historical facts in connection with new drugs with which my experience as Curator may have brought me into contact.

Any such notes that I may be able to contribute will naturally be botanical and personal rather than commercial.

Mr. Eddy has mentioned a few, concerning the history of whose introduction some points might be of interest, *viz:* Coca, Jaborandi, and Strophanthus. If to these I add Chrysarobin and Chaulmugra, I hope that I may throw a little light on their introduction.

COCA.

At the time that Pharmacographia was published in 1878, Coca leaves had not come into use, for no mention is made in it of the drug, although it was known that 40,000,000 pounds of the leaves were produced annually and used throughout Peru and Bolivia, in Europe the extraordinary properties of the leaves were treated rather as a traveller's tale, and it was only about the year 1876 that it attracted serious notice—when Professor Christison's experiments directed attention to the fact that it did possess the power of exciting and sustaining the vital functions, at the same time that it possessed an anaesthetic action which lessened the sense of fatigue and hunger. Weston, who was a celebrated pedestrian about that period, did not find that he derived the stimulant action from chewing the leaves that Christison described, and which were universally attributed to it in Peru and Bolivia. The fact appeared to have been lost sight of that a crystalline alkaloid had been obtained from the leaves by Gaedeke in 1855, which he named erythroxyline, which was further examined in 1860 by A. Niemann, and by W. Lossen in 1865, the name being then changed to Cocaine, also the fact that it produced a transient numbness when placed upon the tongue. But I felt sure that if the alkaloid could be obtained in sufficient quantity for physiological experiments, there would be the possibility of proving whether the plant possessed the properties attributed to it. I asked Mr. Walter Hills, of the firm of J. Bell & Co., if he would prepare from some leaves I supplied to him some of the alkaloid which I would have tested physiologically at one of our Universities. He found, however, that so small a percentage of the alkaloid was obtainable that he was discouraged and would not waste more time in preparing it. Not long afterwards the anaesthetic action of cocaine was published in Austria.

It was not known at that time that two varieties of this plant were in cultivation, one of which contained another alkaloid, nor was it known that the leaves rapidly lost their properties and their percentage of alkaloid when exposed to a sea voyage, or even to a damp atmosphere. Practically all that was known about it was that "*Coca fresca*" was always used, and that it was chewed by the natives with a small dusting of alkaline ash called "*Llipta,*" but the effect of this in producing the invigorating symptoms was not determined.

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*Section on Historical Pharmacy, A. Ph. A., Cleveland meeting, 1922.

[1] Curator of the Museum of the Pharmaceutical Society of Great Britain. For sketch see March JOUR. A. PH. A., p. 193.

But when cocaine came into demand as an anaesthetic, cases of poisoning were not infrequent, until Paul and Cownley pointed out the means of obtaining pure cocaine free from isatropyl-cocaine, the second alkaloid found in the Truxillo leaves. On the commercial side it was found to be more economical to have the cocaine extracted in the crude state in Peru and have it purified in Europe, and when pure cocaine was obtained free from isatropyl-cocaine the danger attending its employment disappeared and confidence in its use as a local anaesthetic returned. Its use by the public has during the last few years developed into a craving which has produced most serious results.

But it is remarkable that the beneficial results accruing from the chewing of the fresh leaves under native conditions have not been traced to their source, whether due to benzoyl-ecgonine or ecgonine alone, produced by decomposition of the cocaine by the alkaline ash chewed with it. The difference ultimately pointed out by botanists between the Truxillo and Bolivian coca plants has, however, led to the galenical preparations being usually made from the Bolivian kind, the Truxillo kind, cultivated chiefly in Java, but also in Ceylon, is mostly reserved for the preparation of alkaloid, since it was found that by reducing all the alkaloids of coca to ecgonine, the cocaine could be built up synthetically from the alkaloid.

STROPHANTHUS.

The history of the use of Strophanthus seed is an interesting one. Dr. Livingstone had told Sir John (then Dr.) Kirk that the natives used an arrow poison derived from some plant, which they would not point out to him. Dr. Kirk being a keen botanist was desirous of finding out and securing herbarium specimens of the plant. While making botanical collections, he was attempting one day to get some leaves of a tall climber, and proceeded to gather some, but the natives with him tried to dissuade him, telling him the plant was dangerous to touch. He, however, managed to secure a twig of the plant, which the natives ultimately admitted was the Kombé plant, and sent it to Kew, where it was referred by Prof. D. Oliver, in the absence of flowers, to *Strophanthus hispidus*, as a more hairy form of that species, and named var. *Kombé* after the native name.

Professor T. Fraser, of Edinburgh, who had been working on the physiological action of the seeds of *S. hispidus*, received some of the seeds of *S. "Kombé"* from Africa through Mr. John Moir, I believe, who was employed by the E. Africa Lakes Co. One day Mr. Moir came to me with an introduction from Professor Fraser, and told me that he had received a shipment of the seeds, and wanted to sell them, so as to show some return in business for the expense of the steam boat which the Company had on Lake Nyassa, and that Professor Fraser told him that I was probably in a position to give him the addresses of wholesale houses who might be willing to purchase the seed. I gave him the addresses of our leading London firms, but not one of them was willing to invest in purchasing the whole of his stock for which he wanted £300. I then advised him to try two American firms in London who were very enterprising, and were building up businesses in this country, *viz.:* Messrs. Parke, Davis & Co., and Messrs. Burroughs & Wellcome.

The last named purchased the whole of Mr. Moir's stock. Mr. Thos. Christy, who was interested in introducing new drugs, offered Mr. Burroughs to take half the quantity, but Mr. Burroughs said "No, the whole or none."

Mr. Christy then sent to Africa to try and get some seed by communicating with Sir John (then Mr.) Buchanan, who sent him some seeds, and also sent some to Professor Fraser. But Sir John, unfortunately, was deceived by the natives, who supplied him with pods so similar in appearance externally to those of *S. Kombé*, that he presumably sent them in good faith as being genuine. Mr. Christy, who was always fond of horticulture, grew some of the seeds in his greenhouse at Sydenham, and to his surprise found that species with different leaves were produced by the seeds, and asked me to look at them. I obtained leafy twigs of each variety, and found that there were two or three different species so far as could be judged from the leaves alone. I learned from the Botanical Gardens at Edinburgh that they had obtained the same results from *S. Kombé* seeds furnished by Professor T. Fraser. The first lot purchased by Messrs. Burroughs & Wellcome seemed to have been entirely *S. Kombé*, but the seeds that subsequently came into commerce were often mixed, though very difficult to distinguish when taken from the pods.

When Mr. J. Moir had sold the seeds he promised to send me flowering specimens of the Kombé plant, but when he called on me 10 years afterwards for information concerning the cultivation of Ipecacuanha, I asked him why he had not sent the Kombé flowers, and he said they had been so taken up with fighting that there had been no time for botanizing.

Then I wrote to his brother, Mr. F. M. Moir, the manager of the East African Lakes Co., and asked him if he could not send me specimens in flower of the different species from which the seeds were collected. From him I received nice flowering specimens and fruits of two forms *Strophanthus Courmontii*, Sacleux and *S. Courmontii* var. *Kirkii* and through Messrs. Burroughs & Wellcome *S. Courmontii* var. *fallax*. The last named was grown from seed introduced by the late Sir J. Buchanan, grown at Zomba, and was therefore presumably supposed by him to be *S. Kombé*.

S. Courmontii has pods and seeds apparently identical with those of *S. Kombé*, but the corolla is much larger and has no tails to the petals, and the seeds give a rose, not dark green color with sulphuric acid, and anyone who saw this plant in flower could not possibly mistake it for *S. Kombé*.

The two varieties were new and described by me.

S. Kirkii has shorter pods and if sent over in the pods would at once be recognized as different. Strophanthus seeds at first were sent over in the pods, but even then, testing the seeds showed that the pods sent as Kombé were mixed, although of the same size and length. But after a time the seeds were sent over freed from the pods, on the ground that the difference in freight added to the cost of the seeds, and since then it has only once or twice occurred that pure Kombé seed has been obtainable in commerce. I wrote to Mr. F. M. Moir, and asked him if it would not be possible to send the *pure* seed under a brand name, for which a higher price could be obtained, and he offered to me the word "Mandala" Brand. (*Pharm. Journ.*, Oct. 1901, p. 389.) He also sent to me a medical man who was going out to Nyassaland for the Company, for me to show him how to use the sulphuric acid test, since difficulty was experienced in obtaining the green reaction. I therefore showed him how to obtain it by using a mixture of eight parts of ordinary oil of vitriol and two of water.

But apparently the work of testing the pods that came in was too irksome, for I found that the mixed pods still came over and Mr. F. M. Moir told me that Strophanthus seeds did not pay to export, as the quantities sold were so small, and the profit consequently so little.

Even the possibility of growing Kombé seed as a crop, and thus getting it pure, presents difficulties, since it is a tall climber and will only grow in suitable localities, and the fruits take a long time to ripen.

Unfortunately the chemistry of the various seeds and their differences of physiological action have only been determined in a few species, and even then it is not certain that the results obtained were from unmixed seed. Certainly some of the seeds sent by Buchanan to Prof. T. Fraser were mixed, since Dr. Tillie (who subsequently died in S. Africa) gave me some of the seeds out of the bottle of seeds he had used in the experiments made by Prof. Fraser and some of these seeds gave a green and others a rose reaction with sulphuric acid when I tested them. In the case of the seed from which Arnaud obtained ouabain, it is apparently not certain whether he used those of *S. gratus, or S. Tholloni*, both of which have glabrous seeds and the seeds used by him were formerly known as "Strophanthus glaber."

The seeds of other species, such as those of *S. Emini*, *S. Nicholsoni* and *S. Sarmentosus*, have also been met with in the Strophanthus of commerce. The seeds of *S. Nicholsoni* described by me in *Pharm. Journ.* (Vol. 4, p. 209) are easily recognizable by their dense, whitish, hairy coat. They were first brought to me by the Rev. Horace Waller, before the introduction of Kombé seed into commerce, but have occurred in commerce unmixed with the Kombé seed some few years after the introduction of the Kombé seed. These seeds are considered by the natives even more poisonous than the Kombé. They give the rose-colored or oubain reaction with sulphuric acid.

The ouabain was originally obtained by Arnaud from the ouabai or Wabei poison, *Acocanthera Schimperi*, another apocynaceous plant (*Pharm. Journ.* (3), Vol. XXIII, p. 965; Vol. XXIV, p. 41).

JABORANDI.

This drug first came under my notice in 1874 when Mr. W. Martindale exhibited it at an Evening Meeting of the Pharmaceutical Society. It had been referred by Professors H. Baillon and G. Planchon to *Pilocarpus pennatifolius*, Lemaire, and this species was accepted as the source of the drug by Bentley and Trimen, and was figured in their Medicinal Plants as the source of Jaborandi. On comparing the leaves of the commercial Pernambuco Jaborandi supplied to me by Messrs. Hearon, Squire and Francis, on which I found some fruit, with those of *P. pennatifolius* at Kew, and with specimens of those from the Hanbury Gardens at Ventimiglia, I noticed that the leaves of the imported Jaborandi plant were more coriaceous, and that the veins were much more prominent on the upper surface, and the leaflets more rounded below, and that the fruits were larger than those of *P. pennatifolius*, Lemaire. (*Pharm. Journ.* (3), Vol. V, p. 582.) But the flowers had not been seen in the imported drug, so that the plants could not be fully described. It was not until seventeen years afterwards that I was able to obtain the flowers for examination. I saw in the *Pharmaceutical Journal* that

a living specimen of the plant brought home from Pernambuco by a medical man, Dr. Paterson, had been exhibited at Edinburgh, and learned that it had been grown there and that it was also under cultivation at the Botanic Gardens at Cambridge. When I saw it at Cambridge I recognized at once that it was the true plant, and asked the Curator, Mr. R. I. Lynch, to send me, if possible, a flowering spike for the Museum Herbarium at Bloomsbury Square. When it arrived about 5 years afterwards, I saw at once that it was quite different, the color of the flowers being yellowish rose instead of a dark purple as in *P. pennatifolius*, and the rachis more slender. It was described by me in the *Pharmaceutical Journal* (3rd. ser.), Vol. XXII, p. 875, and in Vol. XXIII, p. 1008.

But the Pernambuco drug was difficult to obtain in regular supply, and the leaves of *P. pennatifolius* from Rio Janeiro soon appeared in the market. My first introduction to them as a commercial article, was by Mr. John Williams, of the firm of Hopkin & Williams, who wrote enquiring if I could explain why some samples of the drug yielded only half the usual percentage of alkaloid. I asked to see a sample of the leaves he had used, and found that they were unquestionably those of *P. pennatifolius*. These leaves for some years replaced those of the official *P. jaborandi*, and on enquiring at Liverpool I found that although there was a quantity of the genuine leaves on the market there, those of the *P. pennatifolius* from Rio Janeiro were so much cheaper that it was not possible to sell the genuine leaves. The exporters at Pernambuco did not care to continue the export of leaves that entailed a loss, and the export subsequently ceased.

Several other substitutes for the true Jaborandi appeared in the market, the most interesting of which was one which was first noticed by Mr. T. H. Wardleworth in 1893 (*Pharm. Journ.* (3), Vol. XXIV, pp. 394), and was regarded at first as young Jaborandi, and as such forwarded to Kew and to the Museum of the Pharmaceutical Society.

The specimens sent to the Museum were by a mistake handed to Professor Greenish instead of some leaves which Dr. B. Paul had given to me for examination, and which he had received as Senna leaves from Tunis, and which I regarded as the leaves of *Pistacia*, and intended to have given to Professor Greenish to determine whether they were those of *P. lentiscus* or *P. atlantica*. I did not see the leaves afterwards, until Prof. Greenish read a paper on them as those of false senna, which was due to my mistake. In this he rightly referred the leaves he actually received to the *Rutaecae* and as near to *Xanthoxylon*, which indeed they so nearly resembled, that at Kew Dr. Stapf found in the Herbarium there a specimen of identical leaves labelled "Xanthoxylum, Rio Janeiro, Dr. Glaziou," and as this specimen was in flower, Dr. Stapf on examining the plant was enabled to refer it to the genus Pilocarpus, and to describe it as a new species, *Pilocarpus microphyllus*, in the *Kew Bull.*, 1894, p. 4.

It is evident that the three bales of these leaves which Mr. Wardleworth said formed part of a consignment of the ordinary Jaborandi of commerce were regarded by the exporters as small-leaved, but equally good, Jaborandi, a conclusion in which the chemists on this side agreed, since Mr. M. Conroy, who first examined them at Mr. Wardleworth's request, obtained from them "an alkaloid possessing all the chemical properties of Pilocarpine."

The alkaloid manufacturers of pilocarpine soon found that these small leaves

yielded more pilocarpine than those of *P. pennatifolius*, and that it paid better to use them. The leaves of *P. microphyllus* consequently soon came over in increasing quantity, and in the absence of the official leaves were used for galenical preparations. The Chairman of the Pharmacopœia Committee, of whom I enquired if the use of these leaves could not be officially recognized, permitted their use only on condition that the label indicated that the preparation was made from these leaves. Ultimately the leaves of *P. microphyllus* became official "together with those of other species of Jaborandi" in the B.P. 1914, but in the U. S. P. of 1916 the leaves of *P. jaborandi* remained official, together with those of *P. microphyllus*, and the latter has thus now been used for 28 years.

CHAULMUGRA.

This drug has a somewhat chequered history.

When arranging the specimens of Chinese materia medica presented by the late F. Porter Smith, I was surprised to find some seeds labelled "Lucrabau (Chaulmugra) seeds" with the Chinese name *Ta-fung-tsze*, which certainly were not the Chaulmugra seeds of commerce, being much smaller and with a thicker shell.

In Dr. F. Porter Smith's "Materia Medica of China," 1871, they are said to have been imported into China from Siam. On looking through the collection of Chinese drugs presented by the late Daniel Hanbury, I found the same seeds under the name of Ta-fung-tsze. In his description of this drug ("Science Papers," p. 244–5) Hanbury attributes them to Chaulmugra Sp. (he gives an illustration of the seeds on p. 244, Fig. 9), and states that they are imported into China from Siam, and that they have a reputation as a remedy in skin complaints, especially leprosy. He remarks that the plant affording these seeds is not well ascertained. It has always been a pleasure to me to try and carry on Hanbury's work and to attempt to solve problems that unfortunately his early death precluded his solving. On the occasion of Dr. Pierre's visit to this country, therefore, I took the opportunity of asking him if he could throw any light upon the source of this seed, and of some other Chinese drugs, as he was well acquainted with the forest flora of Cochin China and the neighbouring countries. In this case he was fortunately able to solve the problem, and presented to the Herbarium specimens of the plant which he told me was a new species, and had recently been described by him under the name of *Hydnocarpus anthelminthica*, Pierre.

The seeds in 1871 were exported from Bangkok to China to the extent of 6400 lbs. (48 piculs). But it is also exported from Saigon. The herbarium specimen sent by Dr. Pierre was gathered in the Province of Bien Hoa in Southern Cochin China (*Pharm. Jour.* (3), Vol. XV, p. 41). Dr. Pierre told me that the seeds are used as a vermifuge by the Annamites. This statement is confirmed in the "Kew Report," 1878, p. 33, where the seeds are said to be used under the name of "*Dai-phong-tu*" in Saigon as a vermifuge, after the extraction of the oil.

Another seed *Hydnocarpus Wightiana* yields an oil that is apparently sold as Chaulmugra oil or as a substitute for it in Western India. The *fruit* of this species is illustrated in Cooke's Report on the Oil Seeds of India, p. 17, and the *seeds* in the *Pharm. Journ.* (4), Vol. X, p. 522. It has the advantage that the seeds are only half the price of those of the true Chaulmugra, but, like it, are also used for leprosy and other cutaneous diseases.

As late as 1900 the Chaulmugra seed of commerce was believed to be derived from *Gynocardia odorata*, and that plant is illustrated in "Bentley & Trimen's Med. Plants" as the source of the oil, and it was only through an accident that this source was shown to be erroneous. M. Georges Desprez directed attention in 1900 (*Journ. de Pharm.* (6), Vol. XI, p. 315) to a new kind of Chaulmugra seed from Sikkim, that he had received from Dr. Prain, Director of the Botanic Gardens at Sibpur, India. M. Desprez had evidently written for authentic seeds of *Gynocardia odorata*, and he got them! Dr. Prain is too careful a botanist to send the wrong plant. But in the Indian and Colonial Addendum in 1900 Chaulmugra was given as the produce of *Gynocardia odorata*, R. Brown, or of "*G. Prainí*," *Desportes*. Being desirous of seeing the new Chaulmugra seed and to obtain specimens for the Museum, I wrote to Dr. Prain at Calcutta, and he kindly sent me typical specimens both of the genuine Chaulmugra seed and of the seeds of true *Gynocardia odorata* which were the seeds M. Desprez wished to name after Dr. Prain, not recognizing that there had been any mistake about the botanical source of Chaulmugra seed.

When Dr. Prain sent me the seeds, he stated in his letter that so far as the imperfect material in his possession permitted, he had formed the opinion that the Chaulmugra seeds of commerce do not belong to the genus *Gynocardia* at all, but probably to the genus *Hydnocarpus*, but that he could not determine this point satisfactorily until the tree flowered, which might not be till June.

In May, however, he wrote to say that as far as could be made out Chaulmugra seeds are the produce of *Taraktogenos Kurzii*, which is the plant that is named *Hydnocarpus heterophyllus* by Kurz and is a native of Burmah (*Pharm. Journ.* (4), Vol. XII, p. 596).

During the last 20 years the chemistry of the oil of Chaulmugra has been carefully worked out by Dr. F. B. Power and others, and the United States Department of Agriculture has obtained through Mr. J. T. Rock, who holds the office of Agricultural explorer, full and interesting details concerning the natural history of the Chaulmugra tree and its allies, which have been published in *Bulletin* No. 1057. Indeed our own Agricultural Department might well follow the excellent example set by that of the United States of America.

There is one interesting point in connection with the oils of *Hydnocarpus antisyphilitica*, and that is the use of the seed cake as a vermifuge and insecticide. Mr. Rock appears to think that it is more largely used for this purpose in China, than for leprosy. The seed may contain some other constituent than Chaulmugra and that may be worthy of further chemical research.

ARAROBA.

The history of this drug is of interest as showing how difficult it may be to determine the botanical source of a drug.

The first specimen that came under my notice was a small sample of purplish red powder presented to the Museum in February 1864 by Mr. D. S. Kemp, of Messrs. Kemp & Co. of Bombay. It was then called by the name of Goa Powder, as it came from Goa. He described it under this name in the *Pharm. Journ.* for July 1864 (2), Vol. V, p. 345.

The drug was really brought into use in this country through Dr. Fayrer of Calcutta who wrote an article in the *Medical Times and Gazette* for Oct. 24,

1874 on the successful treatment of Indian ringworm by Goa Powder, the composition of which was unknown. He found no remedy so rapid or so certainly effective as the solution in vinegar or lime juice of Goa Powder, which was sold in small phials by the chemists of Calcutta and Bombay under this name, and was believed by Dr. Fayrer to be a secret preparation. He met with a powder similar in appearance and equally efficacious known as Poh di Bahia. It was suggested to him by Mr. D. S. Kemp of Bombay that the probable source of Goa powder was orchella (*Roccella Montagnei*) which was imported in large quantities from Africa, north of Mozambique, into India. Mr. D. Hanbury, however, alleged the Goa Powder to be a "secret remedy whose composition and place of manufacture are alike unknown."

Mr. D. Kemp of Bombay then sent some of the Goa Powder to Mr. D. Attfield to analyze, who found it to contain 80–84 p.c. of chrysophanic acid. Meanwhile a specimen of Arariba presented by D. C. Symes was exhibited by me at an evening meeting of the Pharmaceutical Society on March 4th (*Pharm. Journ.* (3), Vol. V, p. 716) which consisted of yellowish powdery lumps containing pieces of wood, the interstices of which were filled with a powder like that of Goa powder. Dr. Attfield's paper is headed Chrysarobine, Araroba powder, Bahia powder, Goa powder.

As the specimens of Goa Powder presented to the Museum by Mr. D. S. Kemp, Dr. C. Symes and Mr. Postans differed in color and appearance, I asked Mr. Plowman, then demonstrator in the laboratory, to compare them, as they apparently varied in the amount of woody matter present in them, and he found that Araroba yielded 84 p.c. of chrysophanic acid soluble in benzol, Mr. Postans' specimen 87 p.c., and Mr. Kemp's specimen (11 years old) 70 p.c. the crystals in the last named being not so definitely tufted as in the other two, apparently from some change having taken place during that period. But the Araroba of commerce always varies in percentage of chrysophanic acid, according to the amount of fragments of wood present.

The origin of the Goa powder and its identity with Poh di Bahia and the Arariba or Araroba of Dr. Symes, was cleared up to some extent in a letter to the *Med. Times and Gazette* on March 18, 1875, by Dr. J. T. da Silva Lima, translated by Dr. J. L. Paterson of Edinburgh.

Dr. Lima stated that the Goa Powder is known in Brazil in the province of Bahia under the name of Araroba Powder, and in other provinces of Brazil under that of Bahia powder or Po' de Bahia, and stated that Araroba or as some call it Arariba is the name of a Leguminous tree, related perhaps to the tree of the same family furnishing the Brazil wood of commerce. He had been led to suspect the identity of Araroba, Poh di Bahia and Goa Powder by a conversation with Dr. Palasne de Champeaux, chief surgeon aboard the French Steamer La Place, during that vessel's visit to Bahia, who informed him that in Saigon he had successfully used a native remedy called Poh Baia for skin diseases. Dr. Lima gave Dr. Champeaux some of the Araroba powder to compare its action with that of the Poh Baia of Saigon, with the result that the action of the two was found to be identical and an account of the remedy was given by Dr. Champeaux in the *Archives de Medicine navale* for May 1873.

Dr. Lima learned that large quantities of Araroba had for a good many years been exported by a well known firm in Bahia, to Portugal, but the drug was unknown to the chemists and medical men of Portugal, and he concluded, therefore,

that it was re-exported to the Portuguese Colony of Goa in India, and thence distributed under the name of Poh de Baia. Dr. Paterson who paid a short visit to Bahia in the beginning of 1874 learned from the Professor of Botany there, Dr. Bomfim, that the names Araroba and Ariariba are of South American-Indian origin, and derived from a root that means tawny-colored, and that the name is applied by the natives to a number of trees, some of which are described by Martius in his Botany of Brazil, none of which, however, correspond with the tree which yields the Poh di Bahia or Araroba of Commerce, which so far as Professor Bomfim was aware, had not been described by any botanist, and although he had specimens of the leaves and wood sent him, he had never seen specimens of the tree as it grew in a distant part of the Province. Dr. Paterson brought home with him, in default of the seed, two small Araroba plants from cuttings. These were placed in the Botanical Gardens at Edinburgh for transmission to Dr. Little of Singapore, who must have guessed that the Poh de Baia of the East came from Bahia.

The price at Saigon in 1874 was 2 francs per gram, and at Bombay £3.12.0 per lb.

Being anxious to identify the plant if possible, I wrote to Edinburgh Botanic Gardens, and Mr. J. Sadler kindly sent me a leaf of one of the seedlings for examination. I was enabled thus to see that the leaf was not that of a *Centrolobium*, to two species of which Martins had appended the name of Araroba, *viz.: C. robustum and C. tomentosum* (*Pharm. Journ.* (3), Vol. 5, p. 801).

The next step in the identification of the Araroba plant was taken by Dr. Rameiro A. Monteiro, published in the *Journal de Therapeutique*, Vol. VI, p. 248 (*Pharm. Journ.* (3), Vol. VIII, p. 1048), who pointed out that the tree yielding it was apparently an Andira with dark purple flowers, and that the tree is not cultivated. It is distinguished by the name "*Angelim amargoso*" and the powder is invariably known as "Araroba."

Knowing that Mr. Thos. Christy, who was much interested in new drugs, was in touch with the Brazilian Consul, Mr. Knowles, at the time, I asked him if he would kindly try and obtain a flowering and fruiting twig of the Araroba tree. Mr. Christy kindly obtained for me through Mr. Knowles a section of a small trunk and a piece of an older one, showing the formation of the Araroba as a decomposition product in the tissues of the heart wood, and also a leaf and a portion of the flower-spike of the plant itself, and better still a pamphlet in Portuguese by Dr. J. Aguiar describing the Araroba plant under the name of *Andira Araroba* Aguiar. This pamphlet I translated and gave an abstract of it to the *Pharmaceutical Journal* (3), Vol. X, p. 42, and I placed the specimens in the Museum and its Herbarium.

Mr. Thos. Greenish, who took a leading position in advocating the use of the microscope in pharmacy, submitted the wood to a microscopical examination, and ascertained that the Araroba was apparently a decomposition product formed at the expense of a natural constituent of the sap of the tree (*Pharm. Journ.* (3), Vol. X, p. 814).

That it is due to a metamorphosis of the cell membranes also seems clear from the large lumps of pure Araroba that occur in commerce.

Dr. Aguiar seems to regard Araroba as formed by the oxidation of the resin which exists in great abundance in the tree, the oxidation being facilitated by the

canals made by insects, and explains the presence of the larger cavities containing it by the corrosive action of the Araroba on the wood, but he does not seem to have confirmed his theory by experiment. (It seems possible that it may be the work of destructive enzymes.)

It may be interesting to add that the common yellow lichen, *Physicia parietina*, so common on walls, roofs, trees and rocks in this country, was formerly used as a remedy for ringworm in England probably according to the doctrine of signatures, and that it contains chrysophanic acid.

SHALL THE SECTION ON EDUCATION AND LEGISLATION BE DISCONTINUED?*

BY WILLIAM B. DAY.

In connection with the plan for the reorganization of the American Pharmaceutical Association it has been proposed, in all seriousness, to do away with the Section on Education and Legislation. The reasons advanced are that matters of education would be cared for best in the American Conference of Pharmaceutical Faculties, while legislative affairs would be discussed in the House of Delegates.

Against the discontinuance of this Section we should earnestly protest. It will be a sad day for American Pharmacy when we admit that we, as an organization of progressive and intelligent pharmacists, are so little interested in pharmaceutical education that we can afford no place for it on our program but are content to relegate it to an affiliated organization. Nor would this sister organization, the American Conference of Pharmaceutical Faculties, profit by our negligence for they need as much to keep in touch with us as we need to keep in touch with them. After all, the pharmacists of this country and the public which they serve are the most deeply concerned in pharmaceutical education and must give it their tacit approval and support if it is to realize its objective.

The pharmacists, as such, have a right to be heard in educational affairs. And where shall this right be exercised if not in the Section on Education and Legislation of the American Pharmaceutical Association?

For the A. Ph. A., too, it would be a serious mistake to allow these educational interests, which have for so many years been conserved and promoted by our Association, to be split off and turned over to other organizations.

A glance at the history of this Section is sufficient to prove its worthiness of a place in the A. Ph. A. Inaugurated thirty-four years ago, it has been presided over by many distinguished pharmacists and educators; such men as Bedford, Simon, Good, Hallberg and Oldberg, to mention only those who have passed on. The result of their efforts must not be lost to pharmacy. The Section on Education and Legislation has a wide field for usefulness. It can and should be made of increasing value to pharmacy.

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* Section on Education and Legislation, A. Ph. A., Cleveland meeting, 1922.

THE BUSINESS SIDE OF PHARMACY

This department is devoted to the discussion of problems of business administration and commercial policies relating to the various branches of pharmacy.

CONDUCTED BY DR. ROBERT P. FISCHELIS.*

Professor John Maurice Clark, of the University of Chicago, has classified into seven fundamental appeals, the human motives that prompt people to buy. In the order classified they are: (1) the money appeal; (2) the happiness and contentment appeal; (3) the affection appeal; (4) the variety appeal; (5) sentiment; (6) the curiosity appeal, and finally (7) good taste. In explanation of these fundamental appeals it is pointed out under the first one that a purchaser will often buy something because it will bring money to him. Under the second fundamental it is stated that a purchaser may buy goods which have no money value to him, but contribute to his happiness, health and peace of mind. The affection appeal, classified as number three takes into consideration that a purchaser may buy to protect or benefit others. Depending upon his character and intelligence a purchaser may buy from motives that are worthy or foolish; this constitutes the fourth or vanity appeal. The fifth appeal—sentiment—refers to the purchaser who buys to help a good cause along. People often buy novelties to see what they are like—this constitutes the sixth appeal. The last appeal in the list—good taste—is in most cases what might be termed a contributing appeal. The sales presentation which is in good taste is greatly strengthened.

One searches in vain for the outstanding appeal among these seven which might prompt people to buy the things which drug stores sell. In fact the group seems incomplete to one desiring to analyze the motives of buyers with the view of emphasizing the appeals that are most apt to yield rapid results. As far as the drug store customer is concerned we can rule out numbers one, four and five and were it not for the many side lines—non-pharmaceutical in nature—that are creeping into the drug store more and more each day, we might also rule out number six.

This leaves us the appeal to the happiness, health and peace of mind of the individual; the desire to protect or benefit others (chiefly in matters of health) and the appeal to good taste. Any intensive sales work, whether it be conducted by a large sales organization or by a few clerks in a retail drug store will be more successful if buying motives are studied and the predominating appeal kept in mind. Naturally this requires a little preparation and study on the part of the sales personnel. There must be nothing forced or seemingly studied about the selling talk. What is said should be a part of the salesman's actual knowledge and seem to spring from his thoughts spontaneously, if it is to be effective.

In the matter of drug purchases the health of the individual or his family is naturally the predominating thought. Salesmanship in this particular field should be limited to inducements to buy highest quality products in quantities which will be most economical. It is not the pharmacist's business to induce people to buy drugs for self-medication or to offer medical advice. There is however a field of pharmaceutical sales work that has not been worked very intensively

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by the pharmacist and that is the sale of preparations and supplies designed to prevent the spread of disease. A careful study of the work of the medical profession in disease prevention will reveal many avenues of trade for the retail pharmacist. This is a line that can be followed with good grace by the pharmacist and is really a part of his legitimate and necessary service to the public. Here the appeal to the health, happiness and peace of mind of the individual again comes prominently into play and can be skilfully handled to the advantage of both pharmacist and public. The so-called affection appeal, which takes into consideration the protection of others would naturally supplement the foregoing.

Good taste is such a self-evident factor in all sales work that it requires no extended discussion here. As stated near the beginning of this article, Professor Clark's classification of appeals as given seems incomplete unless the seven classifications are considered so broadly as to include factors which are not mentioned in them, specifically. There is for example the utilitarian appeal which certainly influences great numbers of buyers no matter whether they are purchasing drugs, sundries or toilet articles. "What is the most economical thing for me to buy to secure a maximum of efficiency?" "Can I use this product or that article for more than one purpose?" These are questions we meet with every day in the drug store and they indicate that the utility of an article or a product is the foremost consideration in the mind of the buyer who has already found a want for a certain type of product. Practically every advertisement consciously or unconsciously emphasizes the utilitarian appeal and salesmen do likewise.

It is a wise thing for a store owner to sit down for an hour or two each week with his sales personnel and discuss frankly and freely what makes people buy certain things in preference to others; what appeals to them about the merchandise sold in drug stores and what ought to appeal to the public if it were properly presented. Such conferences stimulate self analysis, the analysis of buying or selling appeals and must of necessity make better salesmen of the group. Furthermore, such conferences will stimulate interest and eventually bring about better service to customers as well as greater revenue and reputation to the store.

WHAT IS THE MATTER WITH PHARMACY?*

BY AMBROSE HUNSBERGER.

For several years past the inquiry conveyed in the title of this paper has been a source of argument and controversy in pharmaceutical circles equalled in intensity only by the absorbing interest aroused in the lay mind some years ago when that classic query concerning the "age of Ann" was propounded.

So far as is known the latter problem has not been solved to the satisfaction of everybody and it reasonably may be assumed that our own problem as stated in the title will fail of a solution which will meet with unanimous approval from those who are most interested. This unpromising prognosis, however, should deter no one who is interested in the problem from grappling with it, in his own way and to the best of his ability, in the hope that ultimately a conclusion will be reached which will appeal favorably to the majority of those who are most seriously concerned with whatever may be "the matter with pharmacy."

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*Section on Commercial Interests, A. PH. A., Cleveland meeting, 1922.

The scope which is implied by the wording of the query is probably not intended by those who propound it, inasmuch as its querulous utterance is heard only in retail circles, other branches of pharmaceutical endeavor being seemingly free from any apprehension concerning their normal progress and development.

Certainly there is nothing "the matter" with the colleges. They never before had prosperity thrust upon them so copiously as to compel them to slam their doors in the face of it for sheer lack of room and facilities. They never before loomed as large in the eyes and minds of the laity, and they never before had opportunities equal to those of the present period for enlisting public support and securing adequate funds to carry on their educational and humanitarian work. They never before had better or more carefully selected student bodies to educate and send out into the world to spread the gospel of true pharmacy. They never before compensated their teachers as well as they do now and the teachers never before functioned better than they do at present.

In view of this flourishing condition of the educational branch of pharmacy it would seem as if there was not much "the matter" with it and that we can agree upon the elimination of that phase of pharmaceutical procedure from the problem under discussion.

Has the query then any relationship to the legislative phase in the sense that pharmacy may lack the guarantee of full legal protection of its prerogatives. Hardly, since but few of our States are so benighted, and so remiss in their obligation to humanity, as to fail to set aside the practice of pharmacy as a responsible vocation, entrance to which is limited to the chosen few who have qualified for their essential service to society according to the mandate of law. As a matter of fact nearly all of the States jealously safeguard the health and lives of their citizens by furnishing protection through legislative enactments against incompetent drug-smiths, charlatans and pharmaceutical fakirs. The legal restrictions which deny admission to the practice of pharmacy to those not qualified, to be sure, are not born of an overweening desire to favor pharmacists as a class but they have for their real purpose the protection of society against fraud and deception, and to guarantee that the sick and suffering in each community shall not be deprived of adequate and dependable pharmaceutical service.

To furnish this honorable service to the public is an obligation which the State imposes upon pharmaceutical practice in return for the exclusive privilege which it grants to pharmacists. Since the discharge of this obligation entails nothing further than living up to their pharmaceutical pretentions it does not seem to impose anything upon pharmacists to complain of, therefore, it may be permissible to assume that, with few exceptions, nothing much appears to be "the matter" with the legislative phase of pharmacy.

Is it possible then that the query has an application to the manufacturing branch of pharmacy. Probably not, because in expansion and general development that industry certainly appears to be holding its own. One needs to go back but a decade or two for a basis of comparison in order to visualize the tremendous growth in numbers and size of the pharmaceutical manufacturing enterprises in the United States. These organizations involve profitable investments of millions of dollars in capital and they provide lucrative employment for multitudes of assistants. Their annual output of pharmaceutical supplies which finds its way

into the markets of the civilized world in the aggregate represents a volume of business that staggers the imagination.

Admittedly we shall be unanimous in agreeing that there is nothing noticeably "the matter" with the manufacturing branch of pharmacy.

And of course the query also applies negatively to the wholesale distributors of pharmaceutical products because the increase in growth and numbers in this branch of pharmaceutical endeavor compares favorably with that in the manufacturing branch and we may therefore again anticipate unanimity of opinion when we absolve the wholesale dealers from having anything "the matter" with them.

Having then briefly considered four important branches of pharmaceutical activity and found that there does not seem to be much that has gone awry with them, one is reluctantly but rather irresistibly drawn to the conclusion that the scope of the query must be limited to the one branch of pharmacy not yet considered, and that whatever is "the matter with pharmacy" must lie at the door of the retail pharmacist.

If the present day condition in which the practice of pharmacy finds itself is not altogether an ideal one, does the condition exist because of the policies followed by the latter day practitioner of the art, or does it exist in spite of such effort as he may have put forth to preserve the integrity of his vocation? Since pharmacy, in its broader conception, does not appear to have undergone a retrograde movement in the sense of having its field of activity more circumscribed, or that the facilities for its practice are any less adequate than formerly, it is difficult to understand why one branch of the practice should find itself in a mood for adverse introspection. All of the factors whose potentialities were utilized in the upbuilding of the other branches of pharmaceutical endeavor were equally available to the promoters of the progress of retail pharmacy and if, as it appears, there has been failure to apply the same intensive and intelligent method of utilizing those factors in behalf of retail practice as was used in developing the other branches then it becomes obvious where the fault lies and our query will be more accurately stated as follows "What is the matter with the retail pharmacist."

No good and substantial reason is apparent as to why anything should be "the matter" with the retail pharmacist. Facilities for receiving first class training in all the phases of retail practice were never better, the opportunities for exercising their prerogatives were never more plentiful, they never had better legal protection of their exclusive vocation, the demand for the products of their skill was never greater as is evidenced by the prodigious output of large manufacturing plants, nor was the opportunity for establishing the prestige and importance of their profession as an indispensable factor in community life ever as promising as it was during the last decade. This would seem to establish sufficient grounds to encourage ambition, inspiration, confidence and pride in their calling, and to instill a spirit of determination to achieve the goal of pharmaceutical success by rational methods.

What then is the matter? Has the pharmacist been discontented with what seemed to him to be too circumscribed a field in which to give full play to his talents, and did he complacently surrender his prerogatives to manufacture the products he might have dispensed because he could buy "more cheaply," and in turn did he spurn his obligation to provide adequate pharmaceutical service to his sick

neighbor because it was more lucrative and less troublesome to cater to the salt-water-taffy proclivities of other and less bothersome neighbors. And did he perchance listen to false prophets who led him off into the wilderness of intensive merchandising where the practice of pharmacy is conspicuous by its absence, and did the aforesaid prophets sing a song of "chain store turnover," "merchant prince methods" and divers and sundry other ventures having no special relationship to the practice of pharmacy. And did the false prophets, perhaps through an oversight, fail to whisper that any and all of the spectacular things which they encouraged the pharmacist to trade his birth right for could readily be performed, and often more successfully, by any one with a sharply developed business sense and a more or less obtunded conception of the fitness of things. And did the fickle prophets, thoughtlessly, also fail to point out the jeopardy in which the pharmacist placed his prerogatives when he ignored their reciprocal duties. And did they distract the pharmacist's attention from the obvious fact that some one, somewhere, was laboring incessantly to meet the tremendous and steadily increasing demands for pharmaceutical products, many of which he might produce with credit and profit to himself and by so doing increase the number as well as the permanency of his patrons?

And then completely obsessed with the idea that the rosy path to rapid financial success lay along purely merchandising lines did the pharmacist go on, and on, and on, tying up with this national campaign and with that intensive selling plan and with every other shade and color of scheme that led him further and further away from his safe pharmaceutical anchorage, and in his enthusiasm, having succeeded in forgetting his obligations to society, did he build for himself a beautiful merchandising image of wonderful contour and golden in color, symmetrical from every merchandising standpoint, draped in pharmaceutical garb but devoid of a pharmaceutical soul. And when the first thrill of joy over his handiwork had subsided did a feeling of horror gradually steal over him as he became aware that his beautiful image was undergoing a sickening metamorphosis. Was he startled to see his wonderful image of golden promise gradually being transformed into a sinister cut-throat Frankenstein, which being without a pharmaceutical soul, threatens to rend and destroy, not only its creator and all he should hold dear, but also those who by force of circumstances cannot readily detach themselves from that to which the creator of the pharmaceutical Frankenstein proved faithless? And just about then did the pharmacist stop, look and listen and plaintively inquire "what is the matter with pharmacy?"

Or has he been content to shoulder the obligation which he assumed when he asked the State to keep incompetent and untrained men out of his field of operations, and has he exercised his prerogatives to the full. Has he ministered to the ills and pains of the sick and suffering, and has he tried to uphold the prestige of his calling. Has he sincerely endeavored to build up a legitimate merchandising system suitable to his practice, and has he stood shoulder to shoulder with his colleagues and fought with them for the just rights and privileges of pharmacy. Has he affiliated himself with organizations which in season and out are striving to better pharmaceutical conditions. Has he made any contributions to the advancement of his calling through constructive work or advice. Has he assumed his proper place as an exponent of health conservation in his community, and has

he had the courage to deny himself the profits accruing from transactions which would lower the dignity of his practice. Has he kept faith in maintaining a professional attitude in his work? Has he taken cognizance of his duty to those who will follow him in the manner in which those who preceded him prepared the way?

If he has faithfully lived up to these obligations and has not permitted his professional standing to be submerged in a self-created merchandising maelstrom, in all probability he finds himself so substantially situated socially, professionally and financially as to warrant, so far as he is concerned, the complaisant conclusion that "there isn't a darn thing the matter with pharmacy."

HOSPITAL PHARMACY AND PHARMACISTS.

THE EDITOR, JOURNAL A. PH. A.:

According to a recent statement by Homer F. Sanger, of the Council on Medical Education and Hospitals of the American Medical Association, there are 6580 hospitals in the United States of which number there are 136 in Chicago with 49 hospital pharmacists. A simple calculation gives 87 hospitals in Chicago which have no properly trained and registered pharmacists preparing and compounding the medicines required by the physicians in treating their patients.

In the Greater City of New York we have 146 hospitals (25 public hospitals and 121 semi-public institutions) also 70 private hospitals making altogether 216 hospitals for the entire city. If the same ratio of properly trained pharmacists to the hospitals obtains in New York City we have about 60 per cent. of our hospitals without registered men being in charge of the pharmacies in these institutions. While an examination into the true conditions in New York City would show a much better state of affairs than this it is a fact that there are too many hospitals and dispensaries where untrained persons are allowed to prepare and dispense medicines. If it be true that over 50 per cent. of these institutions which owe their existence to the national desire of the people to take care of its most important asset, its health, are compounding and dispensing their medicines with unqualified help, two things suggest themselves. First, that the pharmacy laws in each state forbid anyone but legally qualified persons to practise pharmacy independent of the requirements of the Harrison Act. Secondly, if untrained persons may be allowed to prepare medicines in quantities and dispense same in 50 per cent. of the American hospitals and dispensaries why cannot the same privilege be extended to the retail drug stores where in the great majority of cases the purely professional part is of minor importance in the day's business?

It is true that most of the larger hospitals fully meet the requirements as to the pharmacy department and some of the most able pharmacists in the country are employed in these institutions, enjoying the respect and confidence of the medical men attached to these places. The patients who are treated in these hospitals get the full benefit of medical science as the medicines used are prepared by trained competent pharmacists in a scientific manner which cannot be the case where this work is in the hands of persons without the necessary knowledge and experience, and it follows as any right thinking man must concede, that where this important work is done by the latter slipshod and unscientific manner the patient neither gets the full benefit of the physician's learning and medical knowledge but the whole business where medicines are concerned is unsatisfactory and

affords golden opportunities for making serious mistakes. The present condition of affairs constitutes a menace to a large number of the sick in this country and it would seem that a common-sense regard for their interests indicates clearly that where a hospital or dispensary is not in the position to employ a trained pharmacist, this important part of medicine should be placed in the hands of a local retail pharmacist who could detail one of his registered men at such times in the day to cover the work properly, in this way the prescribing doctors could be sure of their patients getting the best results from their treatments and the profession of pharmacy be placed on a better basis in every hospital and dispensary where medicine is compounded and dispensed.

(Signed) EDWARD SWALLOW,
Late pharmacist to Outpatient Dept. Bellevue Hospital, New York City.
18 CORTLANDT ST.,
MOUNT VERNON, N. Y.,
JUNE 30, 1923.

NOTES ON PHARMACY OF THE PAST CENTURIES IN SWEDEN—ESPECIALLY THAT OF THE EIGHTEENTH CENTURY.*

BY B. E. HÖCKERT.

The first real drug store in Sweden was opened in Stockholm in 1592 and was licensed by King Johan the Third. It is still in existence. Before that time, drugs and spices were sold in grocery stores, by priests and others who had some knowledge of medicine and drugs. Some of the noblemen employed French or German pharmacists, who kept drugs for them, their families and retainers. During the next hundred years many drug stores were opened in Stockholm and other cities. They generally received their licenses from the local authorities until in the year 1688, King Charles the 11th designated the issuance of licenses a royal privilege. At this time he also prescribed that the Royal Collegium Medicum should examine and issue licenses to those qualified who desired to practice pharmacy or conduct a drug store, here called apothecaries. At this time a law was issued against quackery and illegal sale of drugs. The more important parts of this law are still in force.

Licenses for new drug stores were very rarely issued, and only after the people many times had petitioned for a new drug store. The present law has about the same rules as that of several centuries ago. Stores were sold, but the new owner must have passed his examinations and obtained a royal license. Some change was made in this respect in 1875, and a Royal Committee is now working on a new law.

When more than one drug store was licensed in one place, they were given names generally of animals,—thus, for example, during the time I worked in Stockholm, the drug stores of that city were: The Lion, The Crown, The Engel, The Blackamoore, The Owl, The North Star, The Monkey, The Swan, The White Bear, The Stag, The Monoceros, The Phenix, The Griffon, The Elephant and The Vase. Every drug store thus named had a picture sign, some of the old ones still being in use, but most of them have found their place in some museum, and new picture signs have taken their places. In the beginning of the 18th century, the Royal Medical Collegium started to inspect the drug stores and to test their chemicals

*Read before Section on Historical Pharmacy, A. Ph. A., Cleveland meeting, 1922.

and preparations. It still continues those inspections, which now, in compliance with the law, are made annually.

At this time transportation was very slow and the drug stores few and far between, so it was necessary to keep large stocks. The departments and storage rooms of the establishments, as a rule, were as follows: The store itself where a small stock of everything was kept, customer served, prescriptions filled, and simpler preparations were made. The fixtures in this were always of hard wood and elegant; they were generally well made, as was the rule of the time. Many sets of old fixtures from the 17th or 18th century were still in use in some of the back rooms at the end of the 19th century; now such fixtures have found place in museums. The fixtures included wall cases, the prescription counter, and the counter. The prescription department was not shut off with a high partition, but was open so the customers could look over it. Until about 1750 the vessels were either of glass or of wood; some of the wooden jars are on exhibition in the museums. At the time I was an apprentice, a few of them that were nearly two hundred years old still served as containers for veterinary remedies. During the latter half of the 18th century porcelain jars came into general use.

The other rooms of a drug store were—the tincture chamber, where extracts, tinctures and valuable drugs and chemicals were stored; the material chamber, where bottles, mortars, funnels, graduates and other apparatus and instruments were kept and cleaned, and also the larger quantities of drugs of frequent demand in the stores. Ointments, syrups and other preparations that must be stored in a cool place were kept in the cellar, and crude vegetable drugs in the attic.

The laboratory, during the period spoken of, was a busy place for many preparations were made here. Large mortars of iron and brass occupied an important place; they were generally ornamented on the outside with different figures and bore the date of their manufacture; some of them are still in use, many are kept as heirlooms, and a few are found in museums. While I was working in Stockholm, I took part in the celebration of the 200th birthday of one of these mortars. Next in importance was the distilling apparatus for preparing distilled water, aromatic waters, aromatic spirits, etc. (Waters and spirits were then not made from aromatic oils.) The plaster kettle, tincture press, and other apparatus now only used in large manufacturing plants, or discarded, had place in the drug store laboratory of the period mentioned.

The first modern pill machine came to Sweden about 1740, or a few years later. Before that time the pill mass was rolled out by hand on the prescription counter and cut with so-called pill combs. Plasters were spread on skin with a knife, except adhesive plaster, which was spread on linen by aid of a machine for that purpose. The weights were similar to the old ones used in this country; the scales were not as accurate as the modern, but very good for the time; by a Royal decree of 1857 metric weights were prescribed. Mortars were made of iron, wood, brass, marble, glass, porcelain and serpentine. Gilt and silver coated pills were very much in demand during the 18th century; the coating was applied within hollow spherical hard wood coaters, sometimes simply a paper box was used, in which the pills were rotated with silver or gold foil, after moistening them slightly with weak acacia solution. Spatulas were made of iron, wood and silver.

The stores were kept open from 6 A.M. to 10 P.M.—night-bell service for medicine after the latter hour; all clerks slept and boarded on the premises; the

apprentice, as a rule, slept in the store, and a registered clerk was nearby to be called if needed during the night.

A pharmacopœia printed in Latin was in use during the 17th and 18th centuries,—Pharmacopœia Holmensis, printed 1686. A number of other books for pharmacists were published during the 18th century, many of them translations; a number of German and French books were also in use during this time, just as they are to-day. In 1775, the first edition of Pharmacopœia Swesica was issued. It was printed in Latin as all following editions have been until the 8th, which is printed in Swedish. A special pharmacopœia was published in 1789 to be used when medicine was prescribed for soldiers, sailors, paupers, etc. It was really only a formulary to save the physicians' time and trouble in writing prescriptions. New editions have been published from time to time.

Concerning drugs and medical preparations of the 18th century, I cannot give a complete list, but will mention some not used in our days. Two of the most used preparations were Species Amara Hjernesi (Dr. Hjernes Bitter Spices) and Electuarium Theriaca. The first contained about the same ingredients as the Warburg's Tincture of this country. The formula was prepared by Dr. Urban Hjerne, the first Swede who graduated as a physician. The spices, as well as a tincture made from them, were very much in favor during the 18th and 19th centuries, and considered to be almost a universal remedy for every ailment human flesh is heir to. Electuarium Theriaca is said to have been invented by a Roman physician Andromachus, who was physician to the Roman Emperor Nero. After the formula in Pharmacopœia Holmiensis it was made from 66 different drugs. One of those, and one of the most important, was the flesh of a serpent. The 66 drugs were divided in several classes. When Theriac was to be made, each class of drugs was to be weighed out, and inspected by a magistrate or a representative of Collegium Medicum. After this inspection the mixing took place, first each class for itself, and then the whole. It was considered one of the most important remedies and used for every known ailment. Another form of Theriac for horses and cattle was also largely prescribed. It contained only four drugs and was first prescribed by the famous Arabic physician Avicenna who lived about the year 1000. Another very much used Electuarium was made from nine kinds of roots and Theriac. It was called Electuarium Orvistanum after the City of Orvisto in Italy, where it was first used by a quack about the year 1200. Another drug in general use was Mumia Vera, which was to consist of the fatty resin-like excretion that is to be found on the Egyptian mummies. But as this was too difficult to obtain, powdered mummies were substituted. Many adulterations were on the market, the most used being Asphaltum. This drug was considered a remedy for many ailments, and used both alone and in many mixtures, both for internal and external use. So was it one of the important parts in Pulvis contra Casum, which was said to defend against death itself. Externally applied, it was said to heal all sores; it was an ingredient of the famous Emplastrum Stectum Crolli which contained over 30 drugs and was invented by Dr. Oswald Croll, a famous physician in Frankfort about the year 1600. The Swedish physicians during the 18th century condemned Mumia as of no medical value whatsoever.

EDITOR'S NOTE.—The paper concludes with a list of drugs, which, as the author states, have disappeared from the Materia Medica. This list includes items that appear in old dispensatories, and is omitted.

THE DEPARTMENT OF THE AMERICAN CONFERENCE OF PHARMACEUTICAL FACULTIES

[EDITOR'S NOTE.—The Tentative Program of the Twenty-fourth Annual Conference Meeting is presented herewith. Papers upon educational subjects will be received up to the time of the meeting.

Miss Zada Cooper of Iowa was for years the chairman of the Committee on Activities of Students and Alumni. As chairman, she did a most important work in stimulating student activity in Conference schools. Because of her intimate knowledge of student affairs and because of her broad sympathies with student activities, the chairman has asked her to prepare the paper upon Pharmaceutical Fraternities and Sororities.

RUFUS A. LYMAN, *Chairman and Conference Editor.*]

TENTATIVE PROGRAM FOR THE TWENTY-FOURTH ANNUAL MEETING OF THE AMERICAN CONFERENCE PHARMACEUTICAL FACULTIES AT ASHEVILLE, N. C.

First Session—Monday, September 3rd, 10:00 A.M.

Address—"Presentation of a Plan to Investigate Pharmaceutical Education from the Functional Standpoint."—Dr. W. W. Charters of the Personnel Department of the Carnegie Institute of Technology.

2:00 P.M.—Roll Call of Delegates representing Conference Membership.

The Presidential Address—Charles H. LaWall, Philadelphia.

Report of the Secretary-Treasurer—Miss Zada M. Cooper, Iowa.

Report of the Chairman of the Executive Committee—R. A. Lyman, Nebraska.

Report of the Syllabus Committee—Theodore J. Bradley, Massachusetts.

Reports of the Standing Committees of the Conference—by the Chairmen.

Second Session—September 3rd, 6:00 P.M.

Second Annual Conference Dinner—to be held at a place to be designated later.

Following the dinner the new deans and new representatives of the Conference will be introduced.

8:00 P.M.—Illustrated Lecture by Dr. H. M. Whelpley of Missouri. Subject—"The Deans of the Conference Schools at Play."

8:30 P.M.—Report of the Special Committees and of specially appointed Conference Delegates.

Third Session—Tuesday, September 4th, 9:00 A.M.

An Address—By President H. W. Chase, of the University of North Carolina.

Papers—"Chemical Education in Pharmacy Schools," by Prof. John C. Krantz, University of Maryland. "Laboratory Management," by Dean Willis G. Gregory, University of Buffalo.

Miscellaneous Business.

Election of Officers.

Executive Session—Matters of the utmost importance to the Conference will be discussed at the Executive Session. A full attendance is very important.

Adjournment.

PHARMACEUTICAL FRATERNITIES AND SORORITIES.

BY ZADA M. COOPER, UNIVERSITY OF IOWA.

There are those still who have only condemnation for fraternities and sororities but, though their most ardent supporters cannot claim that they are an unmixed good, all must agree that they have a tremendous influence on college life. Since the days of Solomon groups of people have banded together with a common purpose. College fraternities (and I use the term in a general sense, to include sororities also) are here to stay and they are possessed of possibilities for good or evil

that are very great and very far-reaching. College authorities should recognize this fact and do all within their power to guide and direct. It is for us to help the members of these organizations to realize the full meaning of the obligations they assume, to inspire them to strive individually and collectively for high scholarship and to stand for professional conduct that is above reproach, to do what we can to build character that will send our graduates out to become worthy citizens of any community.

If fraternities are to thrive they must comply with certain specific regulations, not only as to conduct of social affairs but as to scholarship. Social regulations should be simply those of good society everywhere. Every institution has adopted or should adopt such rules concerning chaperons and hours as fit the needs of the city in which they are located. The necessary machinery of administration will vary, but the underlying principles are all the same.

Regulation of scholarship standards should receive considerable attention and the rules submitted by the Conference Committee on Activities of Students and Alumni at the Cleveland meeting have been thoroughly tried in more than one institution. Perhaps the questions involved cannot be covered better than by quoting them.

"In applying scholarship standards to fraternities and sororities and other student groups, the institution should deal with such organizations as groups and not as individuals.

Such groups should be required to maintain a scholarship average substantially that of the average of the men, or women, of the entire institution.

When an organization fails to meet this required standard of average scholarship, the organization should be notified and warned and the national officers, if there be any, should also be informed. Such organization should then be placed on probation and given one year in which to reinstate itself.

An organization that has been on probation for one year without obtaining a group average equal to the average of the men, or women, of the institution, should be denied the right to pledge or initiate into the organization; freshmen should not be allowed to reside in any house maintained by the organization; and such organization should not be permitted to give any social function until the group has reinstated itself."

Very definite policies should govern new organizations. Groups of students wishing to affiliate with fraternities should be required to show their purpose and to maintain their organization for a definite period to the satisfaction of college authorities. This evidence of stability is a necessary safeguard to the college and to the fraternity that may be asked for a charter. Properly constituted authority at each college should investigate and approve the fraternity whose charter is sought. This is a protection to the institution and the student group petitioning.

Judgment acquired from experience and observation should make it possible for faculties to advise and assist so that fraternities and sororities shall be an asset to an institution and a factor in the proper rounding out of any individual's college career.

There is an honorary pharmaceutical fraternity that is based on proper ideals and should rank with honorary organizations in medicine and engineering and law. It is known as the Rho Chi Society and both men and women are eligible. A high degree of scholarship is the basis of election and only individuals recommended by the Dean of the faculty are considered. It is intended to stimulate scholarship and research in undergraduate days and to honor men and women who have rendered exceptional service to professional pharmacy. Chapters may be established

in Colleges that are members of the American Conference of Pharmaceutical Faculties, that have a four-year high school entrance requirement and that are giving three or four year courses of instruction on full time. It was organized at the College of Pharmacy of the University of Michigan and there are now three chapters. H. W. Vahlteich of New York is President and E. J. Traut of Battle Creek, Michigan, is Secretary.

Kappa Psi was originally founded in 1879; in 1887, it was decided to establish chapters only in medical schools and in 1897 schools of pharmacy were added. Since that time two other medical fraternities have been merged with it. The total number of all Chapters including the academic and graduate ones has been over a hundred with a total membership of about eleven thousand.

Dr. A. R. Bliss of Atlanta, Georgia is Grand President.

Beta Phi Sigma was founded in 1888 at the College of Pharmacy of the University of Buffalo. There are now eight chapters and several alumni chapters. The membership is approximately twenty-five hundred and it is exclusively pharmaceutical. Dr. Heber W. Youngken of Philadelphia is Grand Councilor and Editor and Dr. Henry G. Bentz of Buffalo, New York, is Grand Secretary and Historian.

Phi Delta Chi became a national fraternity in 1895 though it had existed earlier as a local society at the University of Michigan. Its members are drawn from students of pharmacy and chemistry. Twenty-six chapters have been established and the total membership is about four thousand, ninety-eight per cent. of which is pharmaceutical. E. W. Thurston of Los Angeles, California is Grand President and L. C. Heustis of Indianapolis is Grand Secretary and Historian.

Rho Pi Phi was organized as a local fraternity in 1919 and nationalized, I believe, in 1921. There are chapters in several eastern Colleges. J. P. Jacobson of Malden, Mass. is Supreme Councilor and J. Meyerson of Buffalo, New York, is scribe.

Kappa Phi was founded at Sewanee, Tenn., in 1909 as a medical and pharmaceutical fraternity and several chapters were established. It may have merged with some other or become inactive, at any rate, I have been unable to obtain any information at the present time.

Lambda Kappa Sigma, the first pharmaceutical sorority, was organized at the Massachusetts College of Pharmacy and was nationalized in 1917 or 1918. There are about ten chapters. Miss Annabel Carter of Waltham, Massachusetts, is Grand President and Miss Georgia Moreland of Winthrop, Massachusetts, is Grand Secretary. There are eleven chapters.

Kappa Epsilon was organized at Iowa City in 1921 from three organizations that had existed at the Universities of Minnesota, Nebraska and Iowa. There are now four chapters with a total membership of about one hundred and fifty. Chapters may be established in schools that are members in good standing of the American Conference of Pharmaceutical Faculties with a four year high school entrance requirement and that require for graduation two years of not less than thirty-two weeks each. Miss Naomi Kenefick of Eagle Grove, Iowa, is Grand President, and Miss Barbara Osborne of Lincoln, Nebraska, is Grand Secretary.

Note—The Program of the National Association of Boards of Pharmacy will be found under "Societies and Colleges."

PROCEEDINGS OF THE LOCAL BRANCHES

"All papers presented to the Association and its branches shall become the property of the Association, with the understanding that they are not to be published in any other publication than those of the Association, except by consent of the Committee on Publication."—By-Laws, Chapter X, Art. III.

Reports of the meetings of the Local Branches should be mailed to the Editor on the day following the meeting, if possible. Minutes should be typewritten, with wide spaces between the lines. Care should be taken to give proper names correctly, and manuscript should be signed by the reporter. To maintain its activity and representation each branch should see that at least three of its meetings during the year are reported in the JOURNAL.

NEBRASKA.

The last meeting for the current year of the Nebraska Branch of the American Pharmaceutical Association was held at the College of Pharmacy, University of Nebraska, Thursday May 24. This was an open meeting and in addition to members of the Branch a number of pharmacy students were in attendance.

The program of the meeting dealt with the early history of pharmacy in the United States. The first number was a discussion of the Beginnings of American Pharmacy, by Prof. J. B. Burt, based upon the recent publication of the Philadelphia College of Pharmacy and Science—"One Hundred Years and The Philadelphia College of Pharmacy." In his talk Professor Burt dealt with the early conditions in pharmacy and the factors which brought about the establishment of the Philadelphia College of Pharmacy.

Dr. R. A. Lyman, Dean of the College of Pharmacy, of the University of Nebraska, was then introduced and discussed the later development of pharmacy. In his talk Dr. Lyman paid a tribute to the Philadelphia College of Pharmacy and Science for the very prominent part it had played in developing the scientific side of pharmacy and its outstanding leadership in pharmaceutical endeavor. J. B. BURT, *Secretary.*

COUNCIL BUSINESS

A. PH. A. COUNCIL LETTER NO. 14.

WASHINGTON, D. C., June 30, 1923.

(Abstract.)

To the Members of the Council:

73. Donation of back numbers of the Journal to the University of Strasburg (See Item 21).—Approved.

74. Convention headquarters decided upon (See Item 68).—At Kenilworth Inn, Asheville.

75. Applicants Nos. 351–417 elected to active membership.

76. (Motion No. 26.) Request for permission to organize a local branch of the A. Ph. A. at Seattle.—In response to the following petition, it is moved by Secretary Day, seconded by DuMez, that permission to organize a local branch at Seattle be granted:

To the Officers and Members of the Council of the American Pharmaceutical Association.

Gentlemen:

The undersigned members of the American Pharmaceutical Association residing in the State of Washington respectfully petition your body to establish a local branch of the association with headquarters at Seattle, Washington; said branch to be known as the University of Washington Branch of the American Pharmaceutical Association. All members of the association residing in the State of Washington who signify their desire to affiliate with said branch, if established, to be considered members of the branch.

C. W. Johnson	Arnold J. Lehman
H. A. Langenhan	Miss Rachel A. Welsh
E. V. Lynn	Miss Marie Gustafson
F. J. Goodrich	Miss Annette Hardinger
Miss O. Hilton	Ernest D. Whiteley
Miss Helen Eheim	Sheldon Meyers
Miss Marie Nyquist	Dale H. Barron
Eugene F. Galeno	H. O. Zumwalt
Harold W. Silke	Louis Rubenstein
Leonard Rhodes	Geo. H. Guy
Warren Stroud	H. E. Holmes
Arthur D. Pochert	J. R. Watson
Peter C. Werba	S. Sure
Miss Bertha L. McFee	S. W. Curtis
Miss Ruth M. Davis	C. Osseward
P. Y. Cheng	Geo. H. Needham
Miss Helen Pratt	H. M. Shaw

Miss Caty Braford	Harry P. Quass
Miss Violet Wise	Henry J. Lawrence
Roland Harper	Herbert F. Neubauer
Peres A. Dix	Frederick V. Lofgren
Glenn W. Henderson	R. A. Bissett
Emily McRae	Ruby Henderson
Clarence B. Halverson	L. R. Nicholson
Ethel Tschudin	

Dean C. W. Johnson, of the University of Washington College of Pharmacy, writes as follows in forwarding this petition:

"I am enclosing a petition, containing 49 names, for a local branch of the American Pharmaceutical Association to be established at Seattle.

"Twenty-seven of the persons signing this petition are faculty members and students who will be connected with, and in, college next school year. I feel quite sure that with a local branch established at this college of pharmacy I can induce the majority of our students each year to take out membership. This will not only help the college by giving us a scientific organization in which all students can participate but will also help the association. I believe that if we can get the student into the association and keep him interested for three or four years while he is in college he will continue to maintain his interest and keep up his membership after leaving college.

"The group signing this petition have not met to organize in any way. It was thought best to wait and, if petition is granted, to call a meeting early in October for organization. It is planned to hold at least six meetings during the college year and to follow the constitution and by-laws of the association in the formation of such by-laws as may be needed for the local branch."

77. Election of active members: No. 418, Laddie Frank Skala, 2353 S. Central Park Ave., Chicago, Ill.; No. 419, Francis J. Balanda, 15 Lawrence Street, Waterbury, Conn.; No. 420, George L. Golding, 21 Clark Street, Malden, Mass.; No. 421, Moses W. Doyle, Jr., 17 Alvord Street, Torrington, Conn.; No. 422, Charles A. Lynch, Cross Street, Uxbridge, Mass.; No. 423, Anselmo Ortiz-Leon, Humacao, Porto Rico; No. 424, J. Burks Harley, 1803 A Street, Lincoln, Nebr.; No. 425, Leon Simmons Gimmy, Jerseyville, Ill.; No. 426, David Wagner, 520 West 163rd St., c/o Dr. A. Kahn, New York, N. Y.; No. 427, Hubert Franklin Nelson, Thomas, Texas; No. 428, George Calvin Kenady, Peacock, Texas; No. 429, Julius Samuel Arfield, 5906 Nicholson Street, Pittsburgh, Pa.; No. 430, John Alexander Dixon, 124 Rebecca St., Kittanning, Pa.; No. 431, Abraham Schreier, 960 Tinton Avenue, New York, N. Y.; No. 432, Henry Wartell, 255 West 111th St., New York, N. Y.; No. 433, Louis F. Bradley, 701 Md. Ave., N. E., Washington, D. C.; No. 434, A. Stewart Mackeigan, 14508 Fischer Rd., Lakewood, Ohio; No. 435, Norman Theodore Mollenhof, Stanton, Iowa; No. 436, J. P. Whitters, c/o The Alkalol Co., 141 Washington St., Taunton, Mass.; No. 437, Ralph J. Levy, c/o Polk Miller Drug Co., Inc., 5 Governor Street, Richmond, Va.; No. 438, Paul Eiche, 311 W. Jefferson St., Effingham, Ill.; No. 439, Edward Henry Kraus, University of Michigan, Ann Arbor, Mich.; No. 440, Charles G. Foucek, 1801 So. Racine Ave., Chicago, Ill.; No. 441, Miss Dixie Lee Webb, 316 Union St., Knoxville, Tenn.; No. 442, William James Bell, Main Street No. 212, Okolona, Miss.; No. 443, E. C. St. Clair, Tupelo, Miss.; No. 444, C. W. Hornor, 740 Union Street, New Orleans, La.; No. 445, E. H. Hyde, Poplarville, Miss.; No. 446, Thos. D. Houston, Woodland, Miss.; No. 447, Winfield Bates Tobb, Houston, Miss.; No. 448, Robert K. Wier, Starkville, Miss.; No. 449, John Edgar Thomas, Eupora, Miss.; No. 450, William Henry Rose, 33 Commerce St., West Point, Miss.; No. 451, P. K. Thomas, 826 Jefferson Street, Tupelo, Miss.; No. 452, W. B. Pollard, Ackerman, Miss.; No. 453, W. D. Welch, 432 Clifton St., Jackson, Miss.; No. 454, Thomas Oslin Slaughter, Waynesboro, Miss.; No. 455, Jos. A. Moss, Miloxi, Miss.

A. G. DuMez, *Secretary.*

A. PH. A. COUNCIL LETTER NO. 15.
WASHINGTON, D. C., July 16, 1923.
(Abstract.)

To the Members of the Council:

78. Organization of a Local Branch at Seattle approved. Motion No. 26 (Item 76), a motion to authorize the formation of a local branch of the A. Ph. A. at Seattle, has received a majority of affirmative votes.

79. Applicants Nos. 418 to 455 elected to active membership.

80. (Motion No. 28.) Program for the Asheville meeting. The Committee on Program presents the following tentative program for the 71st annual convention to be held in Asheville, N. C., September 3 to 8. It is moved by Day, seconded by DuMez, that this program be approved.

TENTATIVE DRAFT OF PROGRAM.

Monday, September 3.

9:00 A.M. Second Meeting of the 1922–23 Council in Grill Room, Kenilworth.

9:00 A.M. National Association of Boards of Pharmacy, Sun Parlor, Kenilworth.

2:00 P.M. American Conference of Pharmaceutical Faculties, Convention Hall, Kenilworth.

2:00 P.M. National Association of Boards of Pharmacy, Sun Parlor, Kenilworth.

7:00 P.M. Third Meeting of the Council, Grill Room, Kenilworth.

8:00 P.M. National Association of Boards of Pharmacy, Sun Parlor, Kenilworth.

8:00 P.M. American Conference of Pharmaceutical Faculties, Convention Hall.

Tuesday, September 4.

9:00 A.M. National Association of Boards of Pharmacy, Sun Parlor B.

9:00 A.M. American Conference of Pharmaceutical Faculties, Convention Hall.

2:00 P.M. Joint Session of the National Association of Boards of Pharmacy, and the American Conference of Pharmaceutical Faculties, Convention Hall.

8:00 P.M. First General Session of the American Pharmaceutical Association held jointly with the House of Delegates, Convention Hall (Committee on Nominations will meet immediately after adjournment of General Session).

Wednesday, September 5.

8:30 A.M. First Session of Historical Section, Room A.

8:30 A.M. First Session of Commercial Section, Grill Room.

10:00 A.M. First Session of Scientific Section, Convention Hall.

10:00 A.M. First Session of Women's Section, Sun Parlor A.

2:00 P.M. Second Session of the House of Delegates, Convention Hall.

7:30 P.M. Fourth Session of the Council, Grill Room.

9:00 P.M. President's Reception and Ball, Ball Room of Kenilworth.

Thursday, September 6.

8:30 A.M. First Session Practical Pharmacy and Dispensing, Grill Room.

8:30 A.M. First Session Section on Education and Legislation, Sun Parlor B.

10:00 A.M. Second Session of Historical Section, Convention Hall.

1:30 P.M. Second General Session of the A. Ph. A., Convention Hall.

4:00 P.M. Automobile Ride and Organ Recital at Grove Park Inn.

7:30 P.M. Fifth Session of the Council, Grill Room.

Friday, September 7.

9:00 A.M. Second Session of Scientific Section, Convention Hall.

9:00 A.M. Second Session of Commercial Section, Grill Room.

10:00 A.M. Second Session of Women's Section, Sun Parlor A.

1:30 P.M. Second Session of Section on Education and Legislation, Sun Parlor B.

1:30 P.M. Second Session of Practical Pharmacy and Dispensing Section, Room B.

3:00 P.M. Final Session of House of Delegates, Convention Hall.

4:00 P.M. Drive and Tea for the Ladies at Biltmore Forest Country Club.

7:30 P.M. Reorganization Meeting of the Council, Grill Room.

8:30 P.M. Final General Session of the A. Ph. A., Convention Hall.

Saturday, September 8.

9:00 A.M. All day trip to top of Mt. Mitchell by automobile.

81. Election of active members: No. 456, Dwight H. Hawks, 113 N. Main St., Goshen, Ind.; No. 457, Charles B. Criss, Gosport, Ind.; No. 458, Joseph Bartoszek, 1342 Lincoln Way West, South Bend, Ind.; No. 459, A. M. Spellman, 2300 Broadway, Gary, Ind.; No. 460, Morris D. Lieberman, 2200 Broadway, Gary, Ind.; No. 461, Jos. W. Weis, 98 State St., Hammond, Ind.; No. 462, Mortimer C. Johns, 1650 Adams St., Gary, Ind.; No. 463, Herman Bill, 1101 E. Pontiac St., Ft. Wayne, Ind.; No. 464, Scott Kelly, Gaston, Ind.; No. 465, James C. Mead, 646 Mass. Ave., Indianapolis, Ind.; No. 466, Edward Charles Gottman, 2801 E. Washington St., Indianapolis, Ind.; No. 467, Clarence Stanley Hall, 909 W. Beardsley Ave., Champaign, Ill.; No. 468, John A. Mertes, 2973 Lincoln Ave.,

Chicago, Ill.; No. 469, Louis Scheffel, 1929 Blue Isl. Ave., Chicago, Ill.; No. 470, Peter R. Bogan, Mackinac Island, Mich.; No. 471, Sidney Odle, 1615 Beaver Ave., Pittsburgh, Pa.; No. 472, Ralph Joseph Hite, 914 Western Ave., N. S., Pittsburgh, Pa.; No. 473, E. Fred Rowse, 214 Baldwin St., Hays, Pa.; No. 474, Joseph Stein, 2170 Webster Ave., Pittsburgh, Pa.; No. 475, John A. Edwards, Scarborough Drug Co., Anniston, Ala.; No. 476, Dr. Albert C. Roy, 82 West 12th St., New York, N. Y.; No. 477, James Stark White, Fairview Drug Co., 1351 N. Liberty St., Winston-Salem, N. C.; No. 478, Morris Rockman, 2322 Madison Ave., Baltimore, Md.; No. 479, Powhatan A. George, Ronceverte, W. Va.; No. 480, George L. Douglass, Kimball, Minn.; No. 481, Frederic W. Rugg, 107 22nd St., Elmhurst, N. Y.; No. 482, Harry S. Kaufman, 77 West St., Newark, N. J.; No. 483, Gordon O. Hulett, Werner, N. Dak.; No. 484, Meyer Shepord, 1735 Washington Ave., New York, N. Y.; No. 485, Charles F. Schinkel, 210 Irving Ave., Brooklyn, N. Y.; No. 486, Aaron Keilin, 1362 Clinton Ave., New York, N. Y.; No. 487, Sam. S. Dworkin 151 St. Ann's Ave., New York, N. Y.; No. 488, William Meiselas, 167 Throop Ave., Brooklyn, N. Y.; No. 489, Max Gluckman, 390 Buschwick Ave., Brooklyn, N. Y.; No. 490, Aaron Segall, 257 Columbus Ave., New York, N. Y.; No. 491, Arthur Harry Adelmann, 283 Stuyvesant Ave., Newark, N. J.; No. 492, Charles Keppler, Jr., 78 Madeline Ave., Lake View, Paterson, N. J.; No. 493, Arthur John Ruffner, 2704 Northwestern Ave., Detroit, Mich.; No. 494, Carl Marks Harmon, 10 Flagship Road, Dundalk, Md.; No. 495, David Earle Powell, Asheville, N. C.; No. 496, Robert Royal Copeland, 104 E. Main St., Ahoskie, N. C.; No. 497, William A. Crabtree, 41 Moore St., Sanford, N. C.; No. 498, Wiltshire Griffith, Fifth and Main Sts., Hendersonville, N. C.; No. 499, William Hicks Justus, Hendersonville, N. C.; No. 500, Norman Walker Lynch, Charlotte, N. C.; No. 501, Harvey Hooper McKay, Main Street, Gastonia, N. C.; No. 502, Walter Spurgeon Martin, 123 Main St., Canton, N. C.; No. 503, George Lanneau Nye, Loris, S. C.; No. 504, Cornelius A. Raysor, 31 Patton Ave., Asheville, N. C.; No. 505, William Alexander Ring, High Point, N. C.; No. 506, Lester Holland Stowe, Belmont, N. C.; No. 507, Duncan Isham Watson, Southport, N. C.

A. G. DuMez, *Secretary.*

UNITED STATES CIVIL SERVICE EXAMINATION FOR MEDICINAL ASSISTANT.

The United States Civil Service Commission announces an open competitive examination for MEDICAL ASSISTANT (PHARMACOLOGY). Receipt of applications will close September 11. The examination is to fill a vacancy in the Bureau of Chemistry, Department of Agriculture, and vacancies in positions requiring similar qualifications at entrance salaries ranging from $3,000 to $3,600 a year.

The duties are to carry on pharmacological and toxicological investigations and research in connection with the standardization and physiological assay of certain drugs, such as digitalis, strophanthus, ergot, pituitary, etc., as required by the United States Pharmacopœia.

Competitors will not be required to report for examination, but will be rated on their general education and medical training, practical or professional experience and fitness, and publications or thesis to be filed with the application.

Full information and application blanks may be obtained from the United States Civil Service Commission, Washington, D. C., or the secretary of the board of U. S. civil-service examiners at the post office or customhouse in any city.

ANETHOL FROM A NEW SOURCE.

Ungerer's Bulletin calls attention to the fact that a new gum resin of interesting possibilities has been investigated by the Imperial Institute of Science and Industry of Australia. This product, called gum nauli, is obtained from a large tree growing abundantly in the Solomon Islands and is of a pale yellow color, smelling strongly of anise.

Analysis shows it to consist mainly of resin, 81.8 per cent., but it also contains something over 10 per cent. of a volatile oil which shows approximately 34 per cent. of anethol. The oil is obtained by distilling the gum resin with steam and anethol is readily obtained from it in the usual way. As a source for anethol this oil can hardly compete with oil anise at the prices prevailing for the latter, but the oil if sufficiently cheap might be of interest for soap perfuming and other purposes.

EDITORIAL NOTES

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Committee on Publication: A. G. DUMEZ, *Chairman;* S. L. HILTON, H. M. WHELPLEY, R. A. LYMAN, W. L. SCOVILLE, and the Editor-in-Chief of the JOURNAL, General Secretary, Treasurer and Reporter on the Progress of Pharmacy, *ex-officio.*

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LABORATORY SEMINAR—PHARMACOGNOSY, PLANT CHEMISTRY AND BOTANY—COMPRISING LECTURES, DEMONSTRATIONS AND DISCUSSIONS.

Through action by President L. D. Coffman and Dean F. J. Wulling the entire facilities of the College of Pharmacy of the University of Minnesota are placed at the disposal of participants in the Seminar referred to in the title. The announcement states there has been a growing realization that if pharmacognocists, plant chemists, botanists, and others interested in medicinal plants, vegetable drugs, and food products could have an annual opportunity of coöperative laboratory work, the results of such studies would be helpful and valuable. The one-day experiment of last year has prompted a program extending over a week, namely, August 20–25.

Prof. E. L. Newcomb is secretary and also a member of the Committee on Arrangements, and with him are associated members of the faculty, whose teaching subjects are allied. Other members of the faculty have coöperated and also heads of departments in colleges of pharmacy, and others; among these are the following: Arno Viehoever, Henry Kraemer, C. B. Gnadinger, H. W. Youngken, E. N. Gathercoal, Albert Schneider, E. E. Stanford, C. J. Zufall, C. W. Ballard, Anton Hogstad, W. F. Sudro, H. C. Hamilton.

The program of the week includes a visit to plant gardens, where methods of growing, harvesting, drying and preparation of herbarium material will be demonstrated and studied. There will be an excursion through a drug milling plant where the different drug mills will be shown in operation, methods of preservation and storing explained and drug containers studied.

Space will only permit of the inclusion of part of the program, of a few of the sessions, so as to give an insight into this most interesting undertaking. Numbers of the program apply to four sessions.

8. Demonstration of methods for drying, garbling, and cleaning of original bales of drugs, spices, or food products.—E. Fischer.

9. Demonstrations of methods of grinding and powdering of bales of drugs, spices, or food products.—E. Fischer.

10. Individual laboratory work, including opportunity for carrying out processes under No. 8 and No. 9.

22. Reagents and uniform methods for work in plant microscopy.—E. N. Gathercoal.

23. Maximum and minimum figures representing measurements of microscopic elements—desirability for a U. S. standard micrometer scale.—E. Fischer, E. L. Newcomb.

24. Quantitative microscopic analysis—demonstration of methods.—H. W. Youngken, A. Schneider.

25. Individual laboratory work.

38. Volatile Oils: Chenopodium—Turpentine and other oils for special study, and demonstrations on methods of preparation, assay, standards, etc.—A. Hogstad, W. F. Sudro.

39. Nigella damascena: Constituents, recent observations.—C. H. Rogers.

40. Electro-metric analysis of alkaloid-containing drugs.—McGill.

41. Individual laboratory work.

47. Digitalis: Dried and undried leaves demonstration of testing various extracts by different biologic methods.—H. C. Hamilton.

48. Domestic ergot: Demonstration, samples and testing.—C. H. Bailey, E. L. Newcomb.

49. Poisoning by rhus, vanilla, primula, anacardium and other plants.—E. D. Brown.

50. Pollen and its relation to hay fever.—C. O. Rosendahl.

51. Aspidium: the biologic method of standardization.—E. D. Brown.

52. Insulin: methods of preparation and testing.—W. P. Larson.

53. Discussion on work of this session, and general summary on the work of the week; discussion on best method for conducting such meetings, to be led by H. W. Youngken, A. Schneider, E. D. Brown, H. C. Hamilton.

COÖPERATION OF MANUFACTURERS, THE COLLEGES, LABORATORIES, HOSPITALS, ETC., IS PROGRESSING.

A comprehensive article on "Insulin: Its Action, Its Therapeutic Value in Diabetes, and Its Manufacture," by the Insulin Committee, University of Toronto, is printed in the *Journal of the American Medical Association*, pp. 1847–1851. Parts of the article are also printed in a bulletin of the University of Toronto. The closing paragraphs of the report follow:

"Now that a satisfactory process has been worked out for the manufacture of insulin on a large scale, the Insulin Committee considers that, at the expiration of the temporary agreement with the Eli Lilly Company, licenses to manufacture insulin should be granted to other firms who are able and willing to comply with certain conditions imposed by the committee. The Eli Lilly Company agrees to assign to the committee patents covering certain improvements in the manufacture of insulin that have been elaborated by it. All information in the possession of the committee, including the various methods involved in the manufacture of insulin, whether patented or not, will be conveyed by the committee to the licensed manufacturers, it being understood, however, that they on their part agree to put at the disposal of the committee any new processess they may devise, whether patentable or not, and that the committee may then transmit this information to other manufacturers. In other words, the policy is to be that all patents already applied for and all information concerning the manufacture of insulin will be interchanged and made available for such manufacturers as satisfy the Insulin Committee that they are in a position to undertake the manufacture of this substance. By this arrangement it is considered that the purposes for which the University of Toronto holds the patent rights will be fulfilled, and that the medical profession will be assured of the most satisfactory product at the lowest cost.

"The Insulin Committee desires to express its appreciation of the whole-hearted manner in which the Lilly research laboratories have coöperated in working out the problems of large scale production of insulin. Without this collaboration it is unlikely that a non-irritating product of such satisfactory potency and durability could have been produced in adequate amounts to meet the demand of the medical profession, in this comparatively short time."

PENETRATIVE POWERS OF ARSENICALS.

The probable reason why the chances for the complete cure of a generalized syphilitic infection are poor, says the U. S. Public Health Service, is because the usual remedies (arsphenamine, neoarsphenamine, and silver arsphenamine) all lack the power necessary to enable them to penetrate the infected tissues in sufficient amounts to destroy the last remaining parasites. Other arsenicals, sulpharsphenamine, tryparsamid, and 3-amino-4-oxyphenol arsonic acid, have superior penetrative powers and their use as remedies is suggested.

The report was made by Carl Voegtlin, M. I. Smith, Helen Dyer, and I. W. Thompson, all of the U. S. Public Health Service, after prolonged experimentation, both chemical and bacteriological, on rabbits. While the authors admit that results so obtained cannot be transferred, without reservation, to the treatment of human syphilis, they nevertheless advance several reasons that cause them to believe that a clinical trial of the more penetrative preparations named is strongly indicated.

In conclusion they express, as Ehrlich did, their belief that no matter what arsenical may be used better results will be obtained from single large doses a week apart than from smaller doses given at shorter intervals.

TOXICITY OF CARBON TETRACHLORIDE.

The toxic effects of carbon tetrachloride have been studied by Lamson and McLean by means of the phenoltetrachlorphthalein liver function test. In two cases the effect on renal function has also been studied by means of the phenolsulphonephthalein test.

It was found that single doses of 4 cc of carbon tetrachloride per kilogram produce functional disturbance of the liver in the dog, with complete return of function to normal within ninety-six hours. Signs of intoxication in these animals could be observed by this method before any visible signs or symptoms were evident. The kidneys did not appear to be affected by this dose. Administration of 2 cc per kilogram produced no demonstrable disturbance in either kidney function. Finally, 4 cc per kilogram, given in divided doses of 2 cc per kilogram at forty-eight hours intervals, was found to have no toxic effect, which is contrary to the belief that divided doses are more toxic than a single massive dose.

GROUP ADVERTISING.

Group advertising has a value because of the coöperation it evidences between retailer, wholesaler and manufacturer—a confidence, significant of belief in one another and a concurrent estimate of the product advertised. The confidence of the public should be maintained—once lost, there will be doubt of sincerity and a questioning of the purpose. While group advertising when rightly directed is constructive publicity, it is destructive when misdirected. Guard it as you would your name.

PERSONAL AND NEWS ITEMS.

Prof. Dr. Hermann Thoms and Mrs. Thoms were guests of honor at a dinner given in New York City, August 7, under the auspices of the New York Branch A. Ph. A., New York German Apothecaries' Society and New York Veteran Druggists' Association. As stated in the July number of THIS JOURNAL, Dr. Thoms is on his way to Japan, whither he has been invited by his pupils. Mrs. Thoms and the professor visited in Philadelphia, August 8. He came to see the Philadelphia College of Pharmacy and Science, of which he is an honorary member. A luncheon was served at the Bellevue-Stratford and, thereafter, points of historical interest were visited by the guests, under the guidance of members of the faculty. Prof. and Mrs. Thoms will stop in Detroit and Madison before continuing their journey to the Pacific Coast.

James Vernor, who is a Detroit Councilman and still active in his own business, celebrated his 80th birthday, April 11. A sketch is printed in JOURNAL A. PH. A., July 1919, p. 529. Mr. Vernor was a member of the first Michigan Board of Pharmacy, in 1885, corresponding secretary of the old Michigan Pharmaceutical Association when it was organized in 1874; vice-president of the Association of Secretaries of State Boards in 1891; and vice-president of the American Pharmaceutical Association in 1888. He was a hospital steward and then a lieutenant in the Civil War. His councilmanic experience extends for over a quarter of a century.

Dr. William Allen Pusey, President-Elect of the American Medical Association, was born in Elizabethtown, Hardin County, Ky., Dec. 1, 1865, son of Dr. Robert B. and Belle Brown Pusey. He received the A.B. degree from Vanderbilt University in 1885, the A.M. in 1886 and the M.D. from the Medical College of New York University in 1888. The following year he began practice in Chicago. From 1894 to 1915 he was professor of dermatology in the University of Illinois School of Medicine. He has been dermatologist at St. Luke's and Augustana hospitals, and was president of the American Dermatological Association in 1910 and of the Chicago Medical Society, 1918–1919. During the war he rendered conspicuous service to the government as chairman of the Committee on Venereal Diseases in the Surgeon General's Office, outlining the plan of attack on these diseases and aiding in the preparation of the "Manual of Treatment of Venereal Disease." He is author of a number of textbooks, and since its foundation in 1920 has been an editor of the *Archives of Dermatology and Syphilology*, published by the American Medical Association. From 1911 to 1922, Dr. Pusey was treasurer of the A. M. A.

J. K. Lilly, head of Eli Lilly & Co., of Indianapolis has returned from a trip around the world. A testimonial dinner was given for him by the Indianapolis Chamber of Commerce, June 12. In his address of the occasion Mr. Lilly said: "A trip around the world affording glimpses into lands impoverished by ignorance and the worship of false gods is sufficient to convince any one that citizenship in the United States is the most precious possession in the world."

Dr. C. A. Browne has been named head of the Bureau of Chemistry.

Dr. Browne is a native of North Adams, Mass., where he was born in 1870. After taking his M.A. degree at Williams, he studied at the University of Göttingen, Germany,

where in 1902 he received both M.A. and Ph.D. degrees. He took up his profession as a chemist in New York in 1892, and in 1895 and 1896 was instructor in chemistry at Pennsylvania State College. After four years as assistant chemist at the Pennsylvania Experiment Station, Dr. Browne returned to Germany for two years to study sugar chemistry. From 1902 to 1906 he was research chemist at the Louisiana Sugar Experiment Station, New Orleans, and in 1906 and 1907 was chief of the sugar laboratory of the Bureau of Chemistry, resigning to become chemist in charge of the New York Sugar Trade Laboratory, Inc. He is an associate editor of the Journal of the American Chemical Society and is the author of many bulletins, papers and textbooks on chemical subjects.

Dr. Charles F. Chandler, professor emeritus of chemistry at Columbia University, consulting chemist of the Chemical Foundation, Inc., member of the American Pharmaceutical Association since 1867, has been elected an honorary member of the London Society of Chemical Industry, which he served as president in 1889–1900.

Dr. Jacob Diner diverted, a gift intended by his many good friends for the purchase of a Cadillac car for him as an expression of appreciation for his efforts in behalf of the New York Drug Store ownership law, to a fund for giving deserving pharmacy students financial help. The occasion was a celebration of the event referred to, honoring all those who so persistently and successfully worked for the passage of the law.

Mrs. L. E. Sayre, wife of Ex-President Sayre, has been seriously ill for several months, but is slowly recovering. Professor Sayre fears that it will be impossible for him to attend the Asheville A. Ph. A. meeting.

Mrs. William H. Gano died July 28th, after an illness extending over several months. Sympathy is expressed to our fellow-member in his bereavement.

The Heinitsh Drug Store, Lancaster, Pa., in addition to its antiquity enjoys the unique record of having been owned and operated by one family for 143 years. From the time Carl Heinrich Heinitsh opened its doors early in 1780 up to the present time, none but a Heinitsh has been a factor in its ownership. Mrs. A. A. Heinitsh is the present owner, although the business is under the management of Edward L. Page. The late Charles A. Heinitsh, owner of the store for a half century, was president of the American Pharmaceutical Association in 1882.

A perfect record of conduct for twenty years in the naval service was disclosed July 7th by Secretary Denby, when he publicly commended **Samuel S. Gant,** of Liberty, Mo., chief pharmacist's mate, upon his transfer to the fleet naval reserve.

"Gant's entire service of twenty years contains no report against him of any infraction of naval regulations," Secretary Denby said. "A clear record of service covering such a long period of time is extremely rare."

Dr. F. A. Grazer, member of the American Pharmaceutical Association, is shown outside of the botanical garden which the doctor is cultivating for the instruction of nurses of the Sacramento Hospital, in *Till and Tile* for May.

Harry B. Mason, who has been Director of Promotion of Parke Davis & Co., is now Assistant to the President.

L. B. Hayward, superintendent of Parke, Davis & Co. laboratories, has been elected a director of the corporation.

Edward Mallinckrodt of St. Louis has given $500,000 toward the construction of a group of new chemical laboratories for Harvard University, it is announced. The building will bear the donor's name and will stand between the new lecture hall and the university museum, near the Wolcott Gibbs and Coolidge laboratories.

The Chemist and Druggist of June 30 featured the London botanical gardens. The illustrations are excellent and the accompanying article interesting. The attractions of Oxford are described so as to serve as a guide for the members of the International Congress of Pharmacy, who visited there July 26.

The annual special issues of the *Chemist and Druggist* are always attractive and interesting and this number is not surpassed in that respect by previous editions. We are impressed by the coöperative support of advertisers who make such an issue possible—there are upwards of 200 pages of advertising.

What will be called the "Bibliography of Bibliographies in Chemistry and Chemical Technology," is now in process of compilation by the National Research Council, Washington. Clarence J. West, in charge of the compilation, has sent out a request to all who have bibliographic data on the general chemical or special fields to aid him in his work, which will in the end benefit all chemical research workers.

OBITUARY.

JAMES SCOTT ROBINSON.

James S. Robinson, member of the American Pharmaceutical Association since 1869, died at his home in Memphis, Tenn., July 11, aged 74 years. Mr. Robinson was born in Philadelphia and served an apprenticeship with Alfred B. Taylor. He graduated from the Philadelphia College of Pharmacy in 1869 and during the same year came to Memphis, to take charge of the retail department of the George W. Jones Drug Company, but very soon thereafter opened his own store at Second and Madison Avenue. His ability as a pharmacist soon became known and his patronage grew, so that it was soon necessary for him to secure larger quarters. On the completion of the Masonic Temple, Mr. Robinson moved his pharmacy to this building where he remained until he built his own store at 22 N. Second St.

Mr. Robinson conducted a professional pharmacy and the establishment was noted for its equipment and its large prescription practice. He was justly proud of the record of having dispensed about two million prescriptions. When the yellow fever epidemics of 1873, 1878 and 1879 struck Memphis, he was one of the first to volunteer his services in aiding the plague victims. He himself suffered a severe attack in 1873.

Mr. Robinson was highly esteemed in business as well as in drug circles. He was a director of the Cumberland Telephone Company and a member of the Board of the Nashville, Chattanooga, and St. Louis Railway and one of the incorporators of the Manhattan Savings Bank of Memphis, of which he was a director and vice-president. He was a trustee of the University of Tennessee and took an active part in municipal affairs, fraternal and charitable organizations.

The funeral service was largely attended and business in all the wholesale and retail drug houses of the city was suspended for a time out of respect to the memory of Mr. Robinson. Not many retail pharmacists of this country have been more successful than he, and few American pharmacies have been better or more favorably known.

The deceased is survived by his widow, Mrs. Alice Rains Robinson, and one daughter, Miss Mary Robinson.

Mr. Robinson attended the Cleveland convention of the American Pharmaceutical Association last year and also the meeting held previously in Cleveland, in 1872.—See group picture in JOUR. A. PH. A. for September 1923, p. 668.

HARRY MANN GORDIN.

Doctor Harry Mann Gordin, died in Chicago, Ill., July 6. He was born in Luston, Russia, August 18, 1860. After completing the gymnasium course he graduated in pharmacy at the University of Moscow. He came to the United States in 1882 and engaged in the drug business at San Francisco, California, until 1893. He then returned to Europe to study chemistry and in 1897 received the degree of Doctor of Philosophy at the University of Berne, Switzerland. Returning to the United States he became the Research Chemist for the United States Pharmacopœia Revision Committee VIII, carrying on his work at the University of Michigan. For two years he was the Chief Chemist of the William S. Merrill Company, Cincinnati, Ohio. In 1902 he was elected Professor of Chemistry in the Schools of Pharmacy and Dentistry of Northwestern University. When the School of Pharmacy of Northwestern University was consolidated

H. M. GORDIN.

with the State University of Illinois in 1917, Professor Gordin remained on the faculty of the Dental School of Northwestern University, holding the chair of Professor of Chemistry until the time of his death.

Professor Gordin was an exceptionally able investigator. He contributed much of great value to our knowledge of alkaloids and drug assays. He was a member of the Committee on Revision of the U. S. Pharmacopœia, IX, and the recipient of the Ebert Prize in 1910.

Professor Gordin was not only an experienced and qualified laboratory worker but also a most efficient teacher. His courses especially in organic chemistry were popular with his students and he spared neither time nor effort in his endeavor to present the subjects in an interesting way. He was always ready to give all the time required to the individual student in need of special help in mastering the subject. His qualities as a chemist and a teacher with his kindly disposition and earnest desire to be of service endeared him to all. Pharmaceutical education has sustained a great loss in his passing. He joined the American Pharmaceutical Association in 1899.

C. W. P.

HENRY CARROLL PORTER.

Henry C. Porter, for forty-five years actively engaged in business in Towanda, Pa., died June 7. Mr. Porter was born in Towanda seventy-one years ago and here he lived all his life. The business to which he succeeded in 1877 was founded by his father, the late Dr. H. C. Porter, in 1848. Mr. Porter was appointed a member of the Pennsylvania Board of Pharmacy by Governor Patterson and served in that capacity for two terms. He was a member of the Masonic Bodies of Towanda and had been presiding officer of most of these Bodies. Mr. Porter joined the American Pharmaceutical Association in 1872.

The deceased is survived by his widow, one son and two daughters.

SOCIETIES AND COLLEGES.

ASHEVILLE MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

The time for the next annual meeting of the American Pharmaceutical Association is fast approaching. Make your arrangements to attend without further delay. If it is your intention to prepare a paper for any of the Sections send it in promptly.

The program of the Conference of Pharmaceutical Faculties will be found in the Department of the Conference in this issue of the JOURNAL.

The tentative program of the American Pharmaceutical Association is part of a Council Letter under Council Business.

Programs of the Sections follow:

SCIENTIFIC SECTION.

First Session.

PHARMACOLOGY AND ORGANIC CHEMISTRY.

"The Accuracy of Cat Method for the Assay of Digitalis." Chas. C. Haskell and R. H. Courtney.

"Composition of a few Alleged Tuberculosis Cures." L. F. Kebler.

"Standardization of Gelsemium." Paul S. Pittenger.

"Report on Biological Assays." (Detailed statement.) Paul S. Pittenger.

"Morphology and Pharmacology of *Chaparro amargosa*." (Discussion of pharmacological data.) Albert Schneider.

"Progress in Salvarsan Therapy." C. N. Meyers.

"Action of Certain Chemical Agents on the Sterility and Activity of Tissue Extracts." Wyle McG. Billings.

"Antispasmodic Action of Chloretone." S. W. Rowe.

"Commercial Sources of Cantharidin." Arno Viehoever.

"Suprarenin (synthetic epinephrin)." Casimir Funk and Harry E. Dubin and Louis Freedman.

"The Stability of Epinephrin in Solutions of Different H-ion Concentrations." R. H. Courtney.

"Diethylphthalate Paper No. 2." J. A. Handy and L. F. Hoyt.

"Some Uses of Hydrogenated Oils." E. V. Howell and E. V. Kyser.

"Radio-activity, Its Discovery, Nature, and Some of Its Revelations." Dr. Francis P. Venable.

"Progress in Vitamine Research." Casimir Funk and Harry E. Dubin.

Second Session.

JOINT SESSION OF SECTION OF PRACTICAL PHARMACY AND DISPENSING WITH SCIENTIFIC SECTION.

"A Land of No Regrets." Motion picture. H. H. Rusby.

"Standardized Colored Fluids and Some U.S.P. Tests." H. V. Arny.

"Pharmacopœia Revision." E. Fullerton Cook.

"National Formulary Revision." Wilbur L. Scoville.

Stunt Show:

"Porcelain Writing Ink." B. B. Wright.

"Meltingpoint Apparatus." R. W. Hale.

"A Simple Device for Adjusting the Siphoning Column of the Soxhlet Extraction Apparatus." Samuel Palkin.

"Micromeltingpoint Apparatus." J. F. Clevenger and A. Viehoever.

"Sedimentation Tube." Arno Viehoever.

"Scrubber for Ammonia Distillates." A. G. Murray.

"Apparatus for Precipitation of Barium Sulphate." A. G. Murray.

"Syphoning Apparatus." E. O. Eaton.

"Sublimation Flask." Arno Viehoever.

"Demonstration of Paramecial Method." Albert Schneider and others.

Third Session.

PHARMACOGNOSY AND PHARMACEUTICAL BOTANY.

"A Review of the Literature of Pharmacognosy and Pharmaceutical Botany." Heber W. Youngken.

"The Histology of *Mire* Stems and Roots." Heber W. Youngken.

"Commercial Types of Mace." L. J. Schwarz and Arno Viehoever.

"Mexican Drugs." J. F. Clevenger and A. Viehoever.

"Selective Sifting." Arno Viehoever and L. J. Schwarz.

"Committee on Quality of Medicinal Products." A. Viehoever.

"Morphology and Pharmacology of *Chaparro amargosa*." (Discussion of morphological data.) Albert Schneider.

A Preliminary Report on the Constituents of Caapi. Harvey A. Seil and Earl B. Putt.

Third Session.

PHARMACEUTICAL, ANALYTICAL, AND MANUFACTURING CHEMISTRY.

"An Improved Method for the Assay of Mercurial Ointment U.S.P., and Blue Ointment U.S.P." D. M. Copley.

"Rapid Method for the Determination of Total Phosphorus in Phosphorus Paste." T. J. Austin.

"A Study of the Relative Preservative Value of Glycerin and Sugar Solutions in certain Official Preparations. John C. Krantz, Jr.

"Composition of Some Mixtures Sold for Making Alleged Genuine European Wines, Beers, etc." L. F. Kebler.

"The Preparation of Acid Fast Caramel." G. D. Beal and Gladys Applegate.

"Preparation of Sucrose Caramel." G. D. Beal and E. R. Littmann.

"The Effect of Free Acids in Emulsions and Liniments." E. V. Kyser and Frank C. Vilbrandt.

"Notes on Amyl Nitrite." L. F. Kebler and W. F. Kunke.

"U.S.P. Syrup of Wild Cherry. Note on Variability of Composition. L. F. Kebler, W. F. Kunke.

"Progress in Sublimation Studies." Arno Viehoever and Ruth G. Capen.

"Genuine Cassia Oil and Synthetic Substitutes." C. A. Herrmann.

"Distillation of Essential Oils in the United States." (Lantern Slides.) E. V. Kyser.

SECTION ON COMMERCIAL INTERESTS.

In an endeavor to secure a wide-spread expression of opinion concerning the advisibility of teaching business subjects in colleges of pharmacy, the officers in charge of this year's sessions of Section on Commercial Interests of the American Pharmaceutical Association have arranged a discussion on the subject, "Should Courses in Business Administration be Included in the Curricula of Pharmacy Colleges, and if so, to What Extent?"

Five prominent educators holding diversified views in the matter have promised to open the symposium, the list including Theodore J. Bradley of the Massachusetts College of Pharmacy; Edward Spease of Western Reserve University; Charles H. Stocking of the University of Michigan; Frederick J. Wulling, University of Minnesota.

Other well-known deans have arranged to take part in the discussion and it is expected that many constructive suggestions will be advanced.

Talks on a variety of subjects of vital interest to retailers will feature the remainder of the program, a partial list of the speakers and their subjects following:

Address of Chairman—Walter M. Chase, Detroit.

"A Thoroughly Respectable Enterprise." Prescott R. Loveland, Ridgewood, N. J.

"Price Maintenance." Henry B. Smith, Brooklyn.

"Cherokee Indian Baskets as a Sideline." Kelley E. Bennett, Bryson City, N. C.

"The Purpose of the Coöperative Wholesale Drug Companies and What They are Accomplishing." R. E. Lee Williamson, Baltimore.

"Retail Salesmanship." Turner F. Currans, New York City.

"Uncharted Commercial Outlets." F. W. E. Stedem, Philadelphia.

"The Art of Merchandising for Profit." H. S. Noel, Indianapolis.

"Window Displays and Their Practical Application in Schools of Pharmacy." E. R. Serles, Brookings, S. D.

"Service Possibilities." Ambrose Hunsberger, Philadelphia.

"Prescription Pricing Psychology." John Culley, Ogden, Utah.

"Comments on Prescription Pricing." Charles R. Wells, Washington, D. C.

"Commercial Interests." A. Margulis, New York City.

"What a Big City Store Holds Out for the Recent Graduate." Clifford H. Rude, Utica, N. Y.

"Teaching Pharmaceutical Law." Howard Kirk, Philadelphia.

"Chain Stores in the United States." Clyde L. Eddy, New York.

"A Panacea for Commercial Success." Harry B. Mason, Detroit.

"The Commercial Advantages of a Local Association." John H. Webster, Detroit.

"Safeguarding American Pharmacy." Samuel C. Henry, Chicago.

"Prescription Pricing as Viewed by Doctor and Druggist." E. Fullerton Cook, Philadelphia.

"Price Cutting and What it Means." M. A. Feinberg, New York City.

The official Association Program will indicate the order in which the papers are to be presented.

Interesting talks on subjects to be announced later will also be made by Frank H. Freericks of Cincinnati, Sinclair S. Jacobs of Atlanta, and several others.

Additional papers are solicited at this time and those wishing to participate should address the secretary of the Section, Henry B. Smith, 291 S. Fifth St., Brooklyn. The meetings of the Section are to be held at the Hotel Kenilworth, Asheville, N. C., during the week of September 3rd.

TENTATIVE PROGRAM FOR SECTION ON PRACTICAL PHARMACY AND DISPENSING.

"Isotonic Solutions." Harvey V. Stokely, Shanghai, China.

"Yellow Wax a Valuable Adjuvant in Pharmacy." Leonard A. Seltzer, Detroit, Mich.

"A Mercantile Weather-cock (The Bubble-Reputation)." L. E. Sayre, Lawrence, Kan.

"Where Does the Hospital Pharmacist Stand?" Edward Swallow, Mount Vernon, N. Y.

"The Absorption of Alkaloids from N. F. Elixirs by Talc." J. C. Krantz, Jr., Baltimore, Md.

"Pharmacy in China." Harvey V. Stokely, Shanghai, China.

Also, a joint session with the Scientific Section has been arranged for, on the N. F. report by Professor Scoville and the U.S.P. report by Professor Cook. Discussion by the committees to follow reports. This is establishing a precedent and should be not only most interesting but highly beneficial to both sections.

TENTATIVE PROGRAM FOR SECTION ON EDUCATION AND LEGISLATION.

First Session.

Chairman's Address. W. F. Gidley.

The Secretary's Report. G. A. Bergy.

Appointment of committees—on resolutions contained in chairman's or secretary's reports.

Special business.

Nomination of officers.

Reading of Papers.

"Physiology and Pharmacodynamics in College of Pharmacy. A. R. Bliss, Jr., and George Bachman.

"Practice of Pharmacy and Dispensing." L. E. Sayre.

Second Session.

Reading of the minutes of the first and joint sessions.

Reading of Papers.

"Shall We Have a National Law Standardizing Clinical Thermometers." Caswell A. Mayo.

Report of Committees.
Unfinished Business.
Election of Officers.
Adjournment.

At the joint session of the N. A. B. P. and the A. C. P. F. and the Section on Education and Legislation.

Reading of Papers.

"The Revised Curricula of the College of Pharmacy of the University of Michigan."

"Progress in Prerequisite Legislation in Michigan." Edward H. Kraus.

TENTATIVE PROGRAM OF THE SECTION ON HISTORICAL PHARMACY.

The Section on Historical Pharmacy has endeavored during the past year to prepare a complete, down-to-the minute, History of American Pharmacy. Eleven members of the association, as noted below, have written chapters covering the history of the branches of pharmacy with which they are most familiar and the chairman of the Section, in addition to serving as editor of the volume, has prepared an introductory chapter. The present session of the Section will be devoted largely to the reading of the several monographs, or abstracts or preliminary outlines of them, by their authors as follows:

"Introductory Chapter." Clyde L. Eddy.
"Pharmaceutical Education." Wortley F. Rudd.
"State Pharmacy Laws." H. C. Christensen.
"Pharmaceutical Associations." J. G. Beard.
"The Practice of Pharmacy in Retail Stores." Robert S. Lehman.
"Commercial Pharmacy." Harry S. Noel.
"Federal Laws Affecting Pharmacy." Jacob Diner.
"The Pharmacopœia and National Formulary." E. Fullerton Cook.
"Biographical Sketches." Caswell A. Mayo.
"Manufacturing Pharmacy." A. R. L. Dohme.
"Wholesale Distribution." C. H. Waterbury.
"Pharmaceutical Journalism." Francis B. Hays.
"Report of the Historian." Eugene G. Eberle.
Reading of as many other papers as are submitted or as there may be time to read.

TENTATIVE PROGRAM.

1923 Convention.

NATIONAL ASSOCIATION OF BOARDS OF PHARMACY.

ASHEVILLE, NORTH CAROLINA.

Monday and Tuesday, September 3-4, 1923.

First Session, Monday, 9:30 A.M.
Sun Parlor, Kenilworth Inn.

1. Call to order by President Edward H. Walsdorf.
2. Invocation.
3. Address of Welcome.
4. Response.
5. Calling roll of Member States.
6. Appointment of Committee on Credentials by the President.
7. President's Address—Edward H. Walsdorf.
8. Appointment of Committee on President's Address.
9. Report of Executive Committee.

Second Session, Monday, 2:00 P.M.
Sun Parlor, Kenilworth Inn.

1. Report of Committee on Credentials.
2. Report of Secretary—H. C. Christensen.
3. Report of Treasurer—J. W. Gayle.
4. Appointment of Nominating Committee.
5. Report of Legislative Committee by John Culley, *Chairman*.
6. Report of Committee on Federal Legislation by H. L. Meredith, *Chairman*.
7. Report of Advisory Examination Committee by H. C. Christensen, *Chairman*.

Third Session, Monday, 8:00 P.M.
Sun Parlor, Kenilworth Inn.

1. Open for presentation of papers and general discussion.
2. Future District Meetings discussion.

Roll Call of District Vice-Presidents.

District No. 1—H. M. Lerou, Norwich, Conn. (Me., N. H., Vt., Mass., R. I., Conn.)
2—A. C. Taylor, Washington, D. C. (N. Y., N. J., Pa., Del., Md., D. C.)
3—M. N. Ford, Columbus, Ohio. (Ohio, Ky., Ind., Ill., Mich., Wis.)
4—D. F. Dexter, Canton, S. D. (Minn., Iowa, N. D., S. D., Nebr.)
5—W. J. Cox, Memphis, Tenn. (Tenn., N. C., S. C., Va., W. Va.)
6—J. F. Tilford, Wichita, Kansas. (Ark., Kas., Mo., Okla., Texas.)
7—E. L. Murray, Americus, Ga. (Ala., Ga., Fla., La., Miss.)
8—F. E. Mortenson, Pueblo, Colo. (Colo., Utah, Idaho, Mont., N. M., Wyo.)
9—C. Osseward, Seattle, Wash. (Ariz., Alaska, Calif., Nev., Ore., Wash.)

Fourth Session, Tuesday, 9:00 A.M.
Sun Parlor, Kenilworth Inn.

1. Report of Committee on President's Address.
2. Report of Special Committees.
3. Report of Publicity Committee, by A. L. I. Winne, *Chairman*
4. Report of Committee on Higher Educational Standards by N. H. Hunter, *Chairman.*
5. Report of Committee on Relations of Boards with Colleges by Lawson J. Cooke, *Chairman.*
6. Unfinished Business.
7. New Business.
8. Report of Nominating Committee.
9. Election and Installation of Officers.

NOTE—Final adjournment may be deferred until after Joint Conference with American Conference Pharmaceutical Faculties.

JOINT SESSION OF NATIONAL ASSOCIATION BOARDS PHARMACY AND AMERICAN CONFERENCE PHARMACEUTICAL FACULTIES.

Tuesday, 2:00 P.M., Convention Hall.

SUGGESTED SYMPOSIUM:

THE NEED FOR CLOSER COÖPERATION BETWEEN BOARDS OF PHARMACY AND SCHOOLS OF PHARMACY.

(1) Importance of standardization of board examinations, also of school courses.

(2) The Schools of Pharmacy graded as "Recognized" should give courses that are fairly uniform quantitatively, though not necessarily exactly alike.

(3) The graduate of a "Recognized School of Pharmacy" should be reasonably certain of passing his State Board Examination.

(4) Is it desirable to increase the entrance requirements of the schools (and therefore for admission to licensing examination) beyond the Conference requirement of graduation from a four year high-school course?

THE SILVER ANNIVERSARY OF THE NATIONAL ASSOCIATION OF RETAIL DRUGGISTS.

The National Association of Retail Druggists, as has heretofore been reported in these pages, will convene in Boston, Mass., September 24–28. The Boston druggists are making the efforts characteristic of them, which will result in a large convention, and the program is being arranged with a purpose to impress New England hospitality. Boston has heretofore entertained the National Associations and, invariably, the meetings have been successful in every respect.

The convention is being advertised through an Eastern Advertising Company in a way that not only directs the attention of druggists to the time and place of meeting but also the public is being informed relative to the convention.

Boston is the commercial center of the section in which it is located, and within its bounds and surrounding territory are many places of historic interest—its famous Common, the Old State House, Old North Hill Church, Bunker Hill Monument (Breed's Hill); near by are Charlestown, Concord, Lexington and Plymouth Rock.

Boston has many beautiful and delightful park drives. In its famous Back Bay district are located the Boston Museum of Fine Arts, the Boston Conservatory of Music, Symphony Hall, Mrs. Jack Gardner's Palace, Massachusetts College of Pharmacy, Harvard Medical School, Peter Bent Brigham Hospital, etc.

On Thursday of Convention week it is proposed to have a Round Table Luncheon at which all those who attended the original meeting twenty-five years ago will be asked to attend and join with the members of the various Veterans' Associations, recently formed through the activities of the Chicago Veterans' Association—"The Daddy of Them All," which came into existence the same year the N. A. R. D. was organized.

There is no end to attractions, but the chief purpose for which the members will assemble is to promote the aims of the organization in the interest of its members, and develop the drug business in accord with modern service.

PROGRAM OF THE FOURTH GENERAL MEETING OF THE INTERNATIONAL PHARMACEUTICAL FEDERATION HELD IN LONDON, JULY 23 AND 24.

The transactions of the meeting of the International Pharmaceutical Federation, held in London July 23 and 24 are, in part, indicated by the outline of the program prepared for the meeting; it follows:

1. President's Address.
2. Secretary's Report, Correspondence.
3. Admission of New Members.
4. Financial Report and Budget.
5. Proposal to amend Article 12 of the Statutes as to contributions and power for adjustment yearly.
6. International Pharmaceutical Nomenclature. Reports from Messrs. Van Itallie, Rousseau, Schamelhout, von Friedrichs, Hofman, and Blumenthal.

7. Regulation of the Sale of Specialties. Reports by Sir W. S. Glyn-Jones, and Messrs. Van Itallie, Collard, Dominet, Veiser, Marder, and Hofman.
8. Scheme of University Courses of Study in Pharmacy. Reports by Messrs. Greenish, Grimbert, and van der Wielen.
9. International Secretariat.
10. Subjects submitted for consideration by
   A The Pharmaceutical Society of Victoria.
      (*a*) Dangerous Drugs Legislation. Proposal to inquire into the international procedure to be taken with reference to the sale of narcotics and poisons. Reports by Messrs. A. Bonville (Houbourdin), Hildreth Glyn-Jones, and Dr. J. B. M. Conbergh.
      (*b*) National Health Insurance.
      (*c*) The desirability of establishing the principle of a professional fee for dispensing.
   B The Pharmaceutical Association of Schaerbeek-Laeken. The inclusion in all Pharmacopœias of stabilized galenical preparations.
   C The International Association of Pharmacists of Cairo and the Provinces.
      (*a*) Exploitation of pharmacy by capital.
      (*b*) The limitation of pharmacies.
      (*c*) Reservation of the sale of drugs and pharmaceutical products to diplomaed pharmacists.
   D Paper by Mr. V. Cofman, B.Sc., on "The Unification of Pharmaceutical Preparations."

OFFICERS OF STATE PHARMACEUTICAL ASSOCIATIONS, 1923–1924.

(Continued from p. 653.)

(Secretaries of associations are asked to make corrections and send in list of officers, and names of next convention city.)

CALIFORNIA.

President, Harry A. Dutton, Los Angeles.
First Vice-President, H. C. Tienken, Lindsay.
Second Vice-President, Victor Schaefer, Oakland.
Third Vice-President, Mrs. Anna Lewis, Pasadena.
Secretary-Treasurer, Thomas W. Jones, Los Angeles.

Pasadena was chosen as the place for the 1924 meeting.

COLORADO.

President, Hal S. Coulson, Boulder.
First Vice-President, Jos. P. Murray, Colorado Springs.
Second Vice-President, Guy L. Richardson, Junction City.
Secretary, Charles J. Clayton, Denver.
Treasurer, C. D. Smith, Grand Junction.

The selection of place for the 1924 meeting was left to the Executive Committee.

CONNECTICUT.

President, S. H. Williams, New Haven.
Vice-Presidents, Henry Ruby, Hartford; and William P. Hindle, Bridgeport.
Secretary-Treasurer, P. J. Garvin, Middletown.

FLORIDA.

President, Leon Hale, Tampa.
First Vice-President, Laurie C. Taylor, Eustis.
Second Vice-President, James Embry, Miami.
Third Vice-President, John Videll, Gainesville.
Secretary-Treasurer, J. H. Haughton, Palatka.

Daytona was chosen as the place for the 1924 meeting.

GEORGIA.

President, T. H. Brannon, Atlanta.
First Vice-President, R. H. Land, Jr., Augusta.
Second Vice-President, A. R. Munn, Atlanta.
Third Vice-President, Charles E. Robinson, Albany.
Secretary, T. A. Cheatham, Atlanta.
Treasurer, Thomas C. Marshall, Atlanta.

Albany was chosen as the place for the 1924 meeting.

INDIANA.

President, Jos. W. Weis, Hammond.
Vice-Presidents, Scott Kelly, Gaston; Edwin Lacks, Newburg, and C. B. Jordan, Lafayette.
Secretary, W. A. Oren, Indianapolis.
Treasurer, Harry H. Miller, Terra Haute.

MISSISSIPPI.

President, W. H. Rayner, Vicksburg.
Vice-Presidents, Granville W. Harrison, De Forest, and H. B. McInnis, Lumberton.
Secretary-Treasurer, A. S. Coody, Jackson.

The next annual meeting will be held at Vicksburg.

MONTANA.

President, Fred Russell, Billings.
First Vice-President, F. V. Patterson, Billings.
Second Vice-President, Alex F. Peterson, Missoula.
Third Vice-President, Edward H. Blair, Roundup.
Secretary, J. A. Riedel, Boulder.
Treasurer, James M. Talbott, Manhattan.
Helena was chosen as the place for the 1924 meeting.

NEBRASKA.

President, Loren Jorden, David City.
First Vice-President, H. H. Harley, Lincoln.
Second Vice-President, Frances Hedges, Fairbury.
Third Vice-President, George Whitney, Ainsworth.
Secretary, J. G. McBride, University Place.
Treasurer, D. D. Adams, Nehawka.
The Kansas plan was adopted.
Grand Island was chosen as the place for the 1924 meeting.

NEW HAMPSHIRE.

President, A. O. Burque.
First Vice-President, E. A. E. McCrillis, Laconia.
Second Vice-President, A. E. Gosselin.
Secretary, Leo Hallisey, Nashua.
Treasurer, Earl Marshall, Manchester.

NORTH CAROLINA.

The vote to affiliate with the American Pharmaceutical Association was unanimous. Both North and South Carolina re-indorsed the Carolina Journal of Pharmacy as official organ.
President, P. A. Lee, Dunn.
First Vice-President, J. P. Stowe, Charlotte.
Second Vice-President, A. A. James, Winston-Salem.
Third Vice-President, N. W. Lynch, Charlotte.
Local Secretary, J. D. Nutt, Wilmington.
Secretary-Treasurer, J. G. Beard, Chapel Hill.
Wrightsville Beach was chosen as the place for the 1924 meeting, June 19–21.

OHIO.

President, W. L. Whelton, Akron.
First Vice-President, Fred L. Mery, Toledo.
Second Vice-President, Henry Pollack, Cleveland.
Secretary, Theo. D. Wetterstroem, Columbus.
Treasurer, L. W. Funk, Columbus.

The delegates elected to represent the Association at the A. Ph. A. meeting are: Harry G. Schmuelling, Edward Spease and Theo. D. Wetterstroem.

SOUTH CAROLINA.

President, T. P. Young, Greenwood.
Vice-Presidents, R. M. Dacus and L. H. Stringer, Greenville.
Secretary-Treasurer, Frank M. Smith, Charleston.
Orangeburg was selected for holding the next annual meeting.

TENNESSEE.

President, D. S. Sanders, Nashville.
Vice-Presidents, T. D. Turner, Henning; A. D. Albright, Knoxville, and G. W. Coulter, Clarksville.
Secretary, W. C. Winter, Nashville.
Treasurer, W. H. Sewell, Jr., Nashville.
The Association will hold its next annual convention in Nashville.

UTAH.

President, Eugene H. Wade, Salt Lake.
First Vice-President, George Huscher, Murray.
Second Vice-President, F. H. Hedquist, Provo.
Secretary, John Culley, Ogden.
Treasurer, Charles Empey, Ogden.
Ogden was chosen as the place for the 1924 meeting.

VERMONT.

President, Urban S. Livingston, Newport.
First Vice-President, Frank A. Gilbert, Brandon.
Second Vice-President, E. W. Gilman, Marshfield.
Third Vice-President, H. M. Louthood, Middlebury.
Secretary-Treasurer, F. W. Churchill, Proctor.
The selection of the place for the 1924 meeting was left to the directors.

WEST VIRGINIA.

Prof. E. F. Kelly was one of the speakers of the convention; his subject was—"Scientific Pharmacy."
President, Fred B. Watkins, Grafton.
First Vice-President, P. A. George, Ronceverte.
Second Vice-President, James E. Armstrong, Wheeling.
Third Vice-President, H. Clay Shaw, Piedmont.
Secretary-Treasurer, Ray B. Cook, Charleston.
White Sulphur Springs was chosen as the place for the 1924 meeting.

WISCONSIN.

President, E. S. Hebbard, La Crosse.
First Vice-President, E. C. Deno, Baraboo.
Second Vice-President, O. E. Rydell, Superior.
Third Vice-President, Leo Hild, Arcadia.
Secretary, W. O. Richtmann, Madison.
Treasurer, Henry Rollman, Chilton.

Green Lake was chosen as the place for the 1924 meeting.

ALL-CANADA DRUG CONVENTION.

The All-Canada Drug Convention, comprising delegates from the Canadian Pharmaceutical Association, Ontario Retail Druggists Association, and the Allied Drug Trades Association, held a four days' convention in Toronto commencing July 9. The address of President V. W. Meek was largely concerned with legislative matters.

There was considerable discussion relative to a pharmacopœia which will meet the requirements of Canadian pharmacists.

Educational matters and schools of pharmacy were subjects of the discussions. Dean C. F. Heebner directed attention to the misuse of the term "drug," especially in connection with narcotic habituation. Dean Charles H. LaWall of Philadelphia was honor-guest of the convention and delivered a comprehensive address on "Education and Ethics."

A resolution was adopted endorsing a code of ethics based upon the principles enunciated in the Code of Ethics of the American Pharmaceutical Association.

The following were elected officers of the Canadian Pharmaceutical Association: *Honorary Presidents*, Wm. Hawker, St. John, N. B.; R. C. Fuller, Amherst, N. S.; J. W. Crooks, Port Arthur; John Hargreaves, Toronto; *President*, Burwell Griffin, Hamilton; *First Vice-President*, J. D. B. F. Mackenzie, Chatham, N.B.; *Second Vice-President*, Hon. G. E. Hughes, Charlottetown, P. E. I.; *Secretary*, F. A. Jacobs, Toronto; *Solicitor*, F. S. Mearns, Toronto; *Chairmen of standing committees*: *Education*, Chas. F. Heebner, Toronto; *Commercial Interests*, W. H. Andrews, Toronto.

THE PHARMACIST AND THE LAW.

REVISION OF INDUSTRIAL ALCOHOL REGULATIONS.

Revision of internal revenue regulations No. 60, relating to industrial alcohol, has been tentatively completed by a joint subcommittee representing the Advisory Alcohol Committee of the drug, chemical and related industries, and the prohibition unit.

According to the *Oil, Paint and Drug Reporter* of July 30th the situation is reported harmonious. The trades are understood to be fairly well satisfied with changes proposed in the regulations, in most respects. Some points, however, remain in dispute and will be passed on by those higher up. Agreement has been reached on many points and a number of concessions have been made to the trades, although it is not pretended that the latter got everything they asked for.

The tentative draft of the regulations has gone to the government printing office for a revised proof, which will be submitted by the subcommittee to the Advisory Alcohol Committee and the Commissioner of Internal Revenue. Inasmuch as the full committee may not agree to all the changes made and as it remains for the commissioner finally to pass upon the matter, there is nothing definite and official about the revision and agreement; hence no publicity on details. However, both sides seem satisfied."

TESTIMONY IN SUIT BROUGHT BY THE GOVERNMENT AGAINST CHEMICAL FOUNDATION CONCLUDED.

The taking of testimony in the suit brought by the government against the Chemical Foundation, Inc., for the return of 4,800 seized German dye and chemical patents sold by the Alien Property Custodian to the Foundation in 1919 for $250,000 was ended July 23. Eight weeks were consumed in the trial before Judge Hugh M. Morris in the United States District Court, Wilmington, Del., and the testimony covers almost 6000 typewritten pages. The exhibits number more than 1000. There were frequent tilts between opposing counsel and a sensation came during the closing days of the trial, when Dr. Louis Freedman was directed by Judge Morris to prepare cinchophen under supervision of observers representing both sides of the case.

Arguments in the case will be heard October 9th.

BOOK NOTICES AND REVIEWS.

Plant Physiology.—By Vladimir I. Palladin. 2nd American Edition, 1922. 360 pp. 173 illus. Translated and edited by B. E. Livingston.

The present second American edition of the book is based on the German translation, and the 7th (1914) Russian edition. A biographical note of great interest is taken from the 9th Russian revision, published in 1922, shortly after the death of Palladin. An excellent photograph of Palladin is also inserted.

The book is written for the elementary student of plant physiology. A classified list of reference books is included. The contents are divided into two parts, the Physiology of Nutrition, and the Physiology of Growth and Configuration. In the first part are discussed assimilation of carbon and energy by plants with and without chlorophyll, assimilation of nitrogen, absorption of ash-constituents, gases and other substances, movement of materials in the plant, transformation of plant constituents, and finally fermentation and respiration.

In the second and much shorter part, a general discussion of growth is followed by a discussion of the influence of internal and external conditions on growth and configuration. In other chapters climbing plants and plant movement and the development and reproduction are briefly discussed.

The text on the whole is very little changed from the first edition published in 1918. The same illustrations, quotations and notes have generally been retained. A few striking recent investigations have, however, been included. In some cases also the book references have been revised and more recent editions, instead of older ones, have been given.

The most striking feature, and an exceedingly useful addition, made by the editor, is the series of summaries concluding each of the chapters. While advanced students may desire a more detailed discussion of recent investigations, including Palladin's own investigations on respiration and fermentation enzymes, the book is remarkably well suited for an introduction to plant physiology and can be heartily recommended to pharmacy students, pharmacists and other workers interested in this subject.

A. VIEHOEVER

PUBLICATIONS RECEIVED.

Bulletins, 192–196, from the Wellcome Chemical Research Laboratories, Snow Hill, London: The "Chemotherapy of Antimony,"—comparison of the antimonyl tartrates with organic compounds of antimony—by Robert George Fargher and William Herbert Gray. "Chenopodium Oil," by Thomas Anderson Henry and Humphrey Paget. "The Constituents of the Flowering Tops of Artemisia Afra, Jacq," by John Augustus Goodson. "Mercury Compounds of Hydroxybenzaldehydes," by Thomas Anderson Henry and Thomas Marvel Sharp. "Silver Salvarsan," by William Herbert Gray.

Reprints from *Journal Association of Official Agricultural Chemists*, Vol. VI, No. 4: "A New Sedimentation Tube and Its Use In Determining the Cleanliness of Drugs and Spices," "Sublimation of Plant and Animal Products—Third Report," by Arno Viehoever. "Domestic Sources of Cantharidin,"—I. *Macrobasis albida Say*, by Arno Viehoever and Ruth G. Capen.

Correcting Misuse of the Word "Drug."—A campaign of interest to those associated with the manufacture, sale, distribution and use of drug store products. By Charles H. Eyles, President of Richard A. Foley Advertising Agency, Inc., 219 N. Broad St., Philadelphia.

The opening paragraphs of this booklet which is being widely distributed, read:

"The Drug Trade Board of Public Information in its June Bulletin addresses an appeal to 500 newspapers in various parts of the country for the purpose of enlisting their support in curbing the misuse of the word 'drug' in connection with stories involving the illegal use and sale of narcotics, commonly known as 'dope.'

"The legitimate drug and pharmaceutical business is being injured every time a story about narcotic peddlers and dope fiends is published and such terms as 'drug peddlers,' 'drug addicts' and 'drug fiends' are used in connection with such stories.

It will be noted that due credit is given to the Drug Trade Board of Public Information, and the work undertaken by Mr. Eyles and the Company of which he is the President, deserves commendation. The success with which the effort has met is evidenced in the booklet by excerpts from letters of endorsement and cooperation written to Mr. Eyles by newspapers, magazines and publishing houses, among them are: *New York Tribune, New York American, Curtis Publishing Company, Pittsburgh Leader, Cosmopolitan, Review of Reviews, Doubleday Page & Co.*, and many others, and the work is going on; in fact, from the interest expressed

in communications to the Journal A. Ph. A. the subject will be brought to the attention of every publication in the United States and Canada.

Merck's Manual of the Materia Medica.—A ready-reference pocket book for the physician and surgeon. 5th edition, $4 \times 6^1/_4$ inches. Compiled and published by Merck & Co., New York. Cloth, 50 cents, artificial leather, $1.00.

While this book in intended principally as a pocket reference book for physicians, pharmacists and members of the allied professions will find much that will be informative and helpful to them. The contents of the volume are arranged in four parts. Part I embraces drugs, chemicals and preparations—not confined to "Merck's" alone—and gives their synonyms, solubilities, physiological effects, therapeutic uses, doses, incompatibles, antidotes, and other useful information; Part II, on therapeutic indications, summarizes the principal means of treatment for each form of disease, giving numerous standard prescription formulas; Part III classifies the various medicaments according to their physiological action; Part IV comprises a comprehensive essay on poisoning and its treatment; an exhaustive dose table; a chart showing the diagnostic points of difference between the eruptive fevers; thermometric equivalents; approximate metric equivalents; a comprehensive chapter on urinalysis; a list of remedies which interfere with urinary tests; tables on infant feeding, and much other useful data.

A Bibliography of Colloid Chemistry.—By Harry N. Holmes. The National Research Council has recently issued a Colloid Bibliography in mimeographed form. The author, Dr. Harry N. Holmes of Oberlin College, Chairman of the National Research Council Committee on the Chemistry of Colloids, intends this edition to be preliminary to a more comprehensive one. Yet it is a book of 135 pages containing 1800 references on 106 topics. All the references are classified and many are accompanied by brief comment as an aid in deciding on their relative importance. This book of 135 pages may be purchased from the Washington office at $1.00.

Among the classified groups are Adsorption, Asphalt, Baking, Biocolloids, Capillary Analysis, Casein, Cellulose and Cellulose Esters, Cements, Clays and Soils, Cleansing, Coagulation, Dialysis, Emulsions, Filtration, Flotation, Foam, Flour, Fogs, Gels, Gelatin, Glass, Glues, Peptization, Petroleum, Photography, Protein Swelling, Protection, Rubber, Sewage, Silver, Soap, Sulfides, Surface Tension, Tanning, Ultramicroscope, Viscosity and Water Proofing.

The theoretical and industrial importance of colloid chemistry is now admitted without question. In fact it links together the sciences of chemistry, physics, zoölogy, botany, geology, medicine, agriculture and even astronomy, whenever that science deals with comets' tails. Few are the industries that do not have colloid problems to solve. The average citizen is surprised to learn that his own body is colloidal in composition, that his digestive processes are governed by colloidal rules of action and that the bacteria of disease are of a colloidal degree of dispersion. And he is astonished to learn that but for the colloidal adsorption of calcium phosphate from the blood stream by his bony cartilage he would be a mere spineless jelly fish; and colloid chemistry is surface chemistry, it is of importance to this same average citizen to know that the total surface of his blood corpuscles is about one acre.

Plant and animal tissue is largely colloidal too, and should be studied from that viewpoint.

Optical Methods in Control and Research Laboratories.—By J. N. Goldsmith, Ph.D., M.Sc., F.I.C.; S. Judd Lewis, D.Sc., B.Sc., F.I.C., Ph.C.; F. Twyman, F. Inst. P. Vol I. (Second Edition, November, 1922).—Spectrum Analysis, Absorption Spectra, Refractometry, Polarimetry. Published by Adam Hilger, Ltd., 75A Camden Road, London, N. W. 1 England. 60 pages. Limp Cloth. Price 1 s. 8 d. It is a guide to applications and to the selection of apparatus. The five illustrations of the book show—arc spectra of lead and copper, absorption spectrum of pseudo-globulin solution, spectroscopic determination of chlorophylls, absorption spectrum of uric acid solution, and absorption curve of anthracene.

Epidemiological and Statistical Data, U. S. Navy, 1918.—Reprint from the annual report of Surgeon General, U. S. Navy for the fiscal year 1919. 574 pages. A number of tables and charts are included.